Railroad Age Gazette

INCLUDING THE RAILROAD GAZETTE AND THE RAILWAY AGE

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For the last twenty years the men in control of the electric railway industry have devoted a great deal of effort to attempting to demonstrate the truth of two propositions: (1) Electric railways render their service for so small a return that they cannot afford to meet demands for lower fares, increased compensation for franchises, and the like; (2) Electric railway securities are highly desirable and good-paying investments. Of course, arguments on the first of these were directed to the public in general, while those on the second were intended for the more limited class of investors. Evidently both of these propositions cannot be true, and the attempt to prove too much has been an important factor in the growth of the present anti-corporation sentiment. Whether a railway is really making money after all the proper charges to operating expenses or income have been provided for is a question of fact that should be easy to decide from the company's books, but there are few managements which have the courage to make the true showing when operation is carried on at a loss, until reorganization is inevitable. The general attitudes of the public and of railway officials are well indicated in the *Annals of the American Academy of Political and Social Science* for May, which is devoted to the regulation of public service corporations. In this number there are 11 papers or communications dealing largely with electric railways. Of these papers eight are by men who have been or are identified with public commissions or civic reform movements, and all these express the same idea, viz.: There must be drastic regulation—and regulation is tacitly assumed to involve always compulsory reduction in rates of fare or increased service or both. Here proposition 2 is accepted and its logical consequences pressed. On the other hand, the three railway officials who contributed to the Annals, while urging proposition 1, deal for the most part in generalities, and do not give those concrete facts absolutely necessary to determine which claim is correct. The time has come when electric railways should seek rather than avoid close regulation by public authorities; if fares can be reduced and the undertaking still prosper, the reductions should be made; but if the enterprise is losing money under present conditions, that fact should be proved, regardless of the effect on the security market, in order that relations with the public may be established on a sound basis.

The unanimous opinion rendered on June 30 by Judges Sanborn, Hook and Adams in the United States Circuit Court at St. Paul, in enjoining the Interstate Commerce Commission from enforcing its order in the Cattle Raisers' Association case, which we print on another page, is the first instance, since the revision of the law, in 1906, in which a Federal court has passed upon an order of the Commission reducing a rate. In this stock yards case the Commission for the fourth time ordered the railroads to reduce from $2 a car to $1, the terminal charge for delivering live stock from the nearest point on their own lines to the Union Stockyards in Chicago, a service in most cases involving a run of several miles of foreign tracks. In dealing with the much discussed "court-review" provisions of the law, Judge Adams (who writes the opinion) brushes aside the complicated provisions of Sections 15 and 16 of the Act in one or two brief sentences. So far as appears from the report before us the order of the Commission was "regularly made and duly served," so that one might assume, from the ninth paragraph of Section 16, that the court was bound to enforce it. But Section 15 clearly implies that a court of competent jurisdiction may set aside an order of the Commission the same as it would set aside an order of any other judicial or quasi-judicial body inferior to itself, and Section 16 gives jurisdiction to the Circuit Court in the district where the railroad has its headquarters. The most novel part of the court's opinion is that relating to the segregation of rates. The Commission, in its most recent opinion in this case (I. C. C. No. 939, Cattle Raisers' Association, etc., v. C., B. & Q., et al.), conceded that the cost to the roads of the terminal service at Chicago exceeded, on the average, $2 a car, but it condemned all of the charge above $1 upon the ground that the $2 charge—which was first exacted in 1894—made the total rates from the starting points to the stockyards excessive. On this point the Circuit Court says that the roads not only had a right, but are especially re-

quired by the law to segregate their terminal from their through charges; that, therefore, the terminal charge, which, as it hardly covered the cost of handling the terminal business, could not be unreasonable in and of itself, should have been treated exclusively upon its own merits; and that if the regular transportation rate plus the terminal charge was too high, the remedy was to reduce the regular rate. The court flatly refused to countenance the suggestion that no rate prescribed by the Commission could be set aside unless it could be shown that it would make the carrier's whole business unprofitable. The reasonableness of every separable and separate rate must be considered separately, and the railroad has a right to receive a reasonable compensation for every distinct service that it renders. A railroad has a right, regardless of what its station-to-station rates may be, to exact high enough rates for switching service to compensate it for the use of the terminal and other property where the switching is done. It has a right when conditions make its terminal or other charges unremunerative to raise them. It has a right regardless of its charges for and profits from freight business, to make such passenger rates as will render its passenger business profitable, considered alone. The case will, no doubt, be taken to the Supreme Court, but meantime some of Judge Adams' dicta should produce a refreshing change in the atmosphere of public discussion.

LOCOMOTIVE STANDARDS.

It would be a long step toward the millennium if all parts of a locomotive could be standardized, and the subject will probably continue to be a puzzling and interesting one for some time to come. There is, of course, such a thing as standardization run riot, where futile attempts are made to do the impossible, but ordinarily such a state of affairs is checked by the necessity for economy. It was shown at a topical discussion on the subject at the Master Mechanics' convention that the exercise of "horse sense," and careful study in the drawing room are needed in order to make a success of standardization. It was also apparent that local conditions were a governing factor, with the result that while certain parts could be readily standardized as between some classes and sizes of locomotives, it would be impossible with others.

The object of such work is to decrease the amount of stock carried for repairs, and to lower the cost of making such parts by the possibility of manufacturing in quantities. While, at first sight, it may seem impossible to standardize locomotive parts to any very great extent, because of the difference in types and sizes in use, especially where a part strong enough for locomotives with large cylinders is too heavy for those with small cylinders, there are, nevertheless, many details to which this does not apply, such as pilots, headlights, whistles, sand boxes, etc., which are entirely independent of the size and type of the engine.

Aside from these matters of detail it was also urged at the convention that it might be profitable to have fewer classes of locomotives. Instead of many types, suitable for different classes of service, it might be good policy to have but one or two types, and accept the criticism of running a heavy locomotive on a short train, as offset by the benefit of having locomotives that will handle any trains they may be put on.

In speaking of what could be done along these lines, Mr. Vaughan, of the Canadian Pacific, said that his road had been particularly fortunate in such work. In getting up a new line of engines the first was a consolidation, for which 21-in. by 28-in. cylinders and 57-in. wheels were adopted. After the consolidation came a 10-wheel with the same cylinders, and after that two Pacific type engines with same size of driving wheels; next came a hump switcher, and then some 10-wheels with fireboxes for anthracite coal as well as using the normal firebox for bituminous coal. These engines are working from Vancouver down to St. John, N. B., the whole way across the continent, and serve to illustrate that it is possible to get one type of engine that will work under fairly dissimilar conditions.

There are only two sizes of engines on the Canadian Pacific; one has a saddle 3 in. wider than the other; the rod brasses, driving boxes, throttles, rockers and other details are used right through the whole series. The result is a class of power such that no matter how the transportation department distributes it, there is no worry about sending castings from one division to another to fit the engines that happen to be put on that division. In this way there is a line of parts that go on virtually every engine.

Commenting on this method, it was urged that it would always be well to take time and study the matter carefully before establishing a standard definitely, and that time spent in the drawing room in considering these matters is time well spent. Thus one reason assigned for the successful operation of this method on the Canadian Pacific is that a year is taken to design a new engine, and hence it is possible to proceed with great care in the establishment of new standards.

This working up of standards for new locomotives met with approval, but it was considered inadvisable to attempt to standardize old locomotives, with the exception of a few fixtures and attachments. Nor would it be worth while to throw away a part that is perfectly good and serviceable merely for the sake of substituting a standard, as that would be defeating the very object of the application, namely, to save expense and waste. But when the whole matter is sifted to its final essence it becomes a question of meeting local conditions in individual cases, and no clearly defined limits can be set as to what may or may not be economical or good practice in the establishment of locomotive standards.

THE STRENGTH AND STRUCTURE OF STEEL.

The text books on the strength of materials touch very briefly on the factor of safety and the working stress for various grades of steel under different conditions of loading, with the result that there is usually a feeling of uncertainty as to the proper factor of safety and a tendency to use a higher factor than is necessary in order to insure safety, with a corresponding increase in the weight of metal. This is especially true where the material is subjected to alternating stresses and the load suddenly applied, as it is in many machines and in parts of the steam engine. The factors for such conditions in general use to-day are based upon Wöhler's experiments, made nearly forty years ago. This method of testing the resistance to alternating stresses consists in rapidly revolving the test piece and applying the load by a suspended weight near the outer end of the bar. The load is adjusted so as to produce a stress within the elastic limit, and its method of application is similar to that of a car axle or a revolving shaft. Considering a point on the circumference at the top, the cycle of stress changes as the bar rotates, from maximum tension to zero at 90 deg.; then to maximum compression at 180 deg. and to zero again at 270 deg.

Wöhler's experiments covered a period of 12 years and demonstrated the fact that metals subjected to rapidly varying stresses will ultimately break under a load within the elastic limit, and established the law that as the differences of stress increase the cohesion of the materials is affected in such a manner that the minimum stress required to produce fracture is diminished. In these experiments the applications of the load followed each other with great rapidity, yet a certain length of time was required for the resulting stresses to attain their full intensity, and for some grades of steel as many as 40 million applications were required to produce fracture. The influence due to the rapidity of the application, to the

rate of increase of the stress and to the duration of individual strains still remains a subject for investigation.

In some railroad laboratories the work of testing staybolt iron and axle steel by the rotary method with stresses within the elastic limit was patiently and persistently conducted, covering a period of several years, and similar work was done on various grades of steel at the Watertown arsenal. While these experiments have been useful in detecting brittle steel and in indicating the general characteristics of steel suitable for alternating loads, there has been some confusion in the correct interpretation of the results, and it is doubtful if the definite relative values for the resistance of steel can be determined in that way. They indicate a vast superiority of high carbon steel over wrought iron, and while this interpretation might be accepted for some conditions, it is well known that for several details of railroad rolling stock which are subjected to repeated blows, wrought iron is preferred to steel.

The Watertown kinetic tests of steel under a fiber stress of 40,000 pounds per square inch show that steel containing .015 carbon breaks after 170,000 alternations of stress, while that containing 0.45 per cent. carbon breaks after 976,000 alternations. This could be interpreted as meaning that that area of section with the latter grade might be only one-fifth that of the former, which anyone would doubt, and they would still be uncertain as to the relative strength of the two steels.

A quicker and more satisfactory method of testing is now used, which substitutes a reciprocating motion for the rotary, and the load applied insures a stress just beyond the elastic limit, on the plane of maximum stress. Modern staybolt testing machines are designed on this principle, the advantage being that the results quickly reflect the same liability to fracture which would be obtained by testing within the elastic limit under stresses applied for a very long period. The new method not only measures the comparative resistance to fatigue, but has predicted liability to fracture from causes altogether apart from the fatigue phenomenon and has discovered brittleness in material which the older method failed to detect. It has been especially useful in showing that the relation of elastic limit to ultimate strength is materially affected by annealing and by cold rolling and by chemical composition.

Experiments made by Professor J. O. Arnold, of Sheffield University, England, with the direct bending tests have shown the effect on the resistance of steel, of the texture, as regards the crystallization of its ferrite, and the distribution of its perlite and sulphide of manganese. The fiber of wrought iron is cinder and that of steel is sulphide of manganese. Sulphide of manganese in steel was discovered in the laboratories of the University of Sheffield in 1896, but its effect on the mechanical properties of steel is still imperfectly understood. Its effect in practically giving fiber to steel in the direction of rolling, so that there is a marked difference in the strength of the same sample, depending upon the direction in which it is tested, has been demonstrated, but is perhaps not generally known and it may be worth while to explain it briefly: In steel containing 0.05 per cent. sulphur by weight there is approximately 0.25 per cent. sulphide of manganese, which is sufficient to have an appreciable effect upon the structure of the steel. It permeates structural steel in the form of millions of little pointed rods parallel with the direction of rolling, and they are equivalent to fissures filled up with a fused and brittle material. Under the bending test when the line of stress is at right angles to the length of the rods, their effect on the strength of the steel is at a minimum, but when the plane of maximum stress is parallel to the sulphide rods, or fiber, their effect is at a maximum. In the static test of steel in the ordinary tension machine and under the latter condition, the serious weakening effect of the sulphide fiber is not clearly revealed.

This new light on the structure of steel and its effect upon its strength should be credited to the method of kinetic testing by repeated bending in a reciprocating machine. A mild steel containing 0.04 sulphur may show in the direct tension test a difference between a longitudinal or transverse test piece only 2,000 to 3,000 lbs. maximum stress and 4 or 5 per cent. elongation in 2 in., but under the bending test, the difference in the number of alternations endured may be over 100 per cent. In specifications for steel, phosphorus has usually been regarded as the principal cause of brittleness, and much more attention has been paid to its limits than to that of sulphur. Static tension tests are usually made in the direction of rolling and they have revealed so little of the effect of the sulphur content that metallurgists have regarded it as having no appreciable effect upon the physical qualities and they regard its influence within ordinary limits as unimportant. The more recent knowledge which has been obtained by the repeated bending tests indicates that it is also important to limit the sulphur content to small proportions in steels which are heavily loaded and subjected to rapid alternating stresses. In such steel both sulphur and phosphorus should never exceed 0.05 per cent. each.

GOVERNMENT REGULATION OF RAILROAD SECURITIES.

The article by Commissioner Franklin K. Lane, of the Interstate Commerce Commission on "Railroad Capitalization and Federal Regulation," in the June *Review of Reviews*, is gratifying in its moderation. Mr. Lane does not favor empowering the Commission to pass upon all future security issues. He proposes that Congress shall enact a law (1) defining the purposes for which railroad stocks, bonds and notes may be issued; (2) requiring the directors of each road to make a record of every proposed issue and of its purpose or purposes on the minutes of the corporation, to which a majority of the directors must subscribe under oath, this statement to be sent to the Interstate Commerce Commission; (3) requiring an annual report, sworn to by a majority of the board of directors, to be sent to the Commission setting forth how the securities were disposed of, their proceeds, and the use made of the money; (4) providing an imprisonment penalty for directors who shall deviate from the declaration of intention made at the time of the issuance of the securities. The Commission, having access through its special agents to the accounts of the roads, would usually be able to detect violations of the act.

If we concede, for the purposes of this discussion, that governmental regulation of security issues is economically defensible, it is evident that a correct diagnosis of the disease to be cured should precede prescription of a remedy. The popular notion is that capital issues should be limited to prevent passenger and freight rates from being made excessive in order to pay dividends upon watered stock. But owing to competitive and other economic conditions, there is no direct relation between rates and capitalization. The over-capitalized road cannot raise or keep its rates the smallest fraction higher than those of its competitors that are not over-capitalized. The real evil that excessive capitalization leads to is gambling and dishonest manipulation of stocks that causes loss to innocent persons and impairs public confidence in the stock market and in all railroad securities, and sometimes results in "skinning" the property, in order to pay dividends upon the inflated capitalization. Earnings that should be applied to keeping up the plant go to the stockholders; the property declines in value and the service rendered deteriorates. Meantime the overcapitalization has become a matter of public knowledge, and new funds for legitimate betterment work cannot be had.

The remedy for these evils is not to require that new securities shall be sold at par or at the market value of old securities—a rule which dries the well-springs of investment, as in Massachusetts. The proper remedy is by some means or other to compel railroad directors and managers to apply

all the money derived from securities, whether sold above par or below par, to permanent development and improvement of the property. The complement to this proposition is that stockholders shall be permitted to receive from the earnings of the road, after it shall become profitable, such dividends as will compensate for early losses and will yield an average return as a large as can be got from any other equally risky and equally well managed business. When a concern, whether wittingly or not, pays dividends out of capital, or out of funds that should go to keeping up the property, there are breakers ahead for its owners and for the community it serves.

How shall railroad managements be induced or compelled to spend wisely and honestly upon the property all receipts from the sale of securities? It is the fashion to denounce railroad officers and directors for sins of omission and commission. It is too often forgotten that stockholders owe duties to both themselves and the public which, in this country, they usually do not perform. Directors would be more than human if they did not sometimes yield to the temptations thus offered. Stockholders in American railroads should require annual meetings to be held at convenient times and places, and they should attend personally and discuss and criticize the acts of their directors, as is done in England. No man—no body of men—has any right to ask the public to incur the expense and trouble of protecting him against the consequences of his neglect of his own duty and self interest. It is said, however, that stockholders in large railroads, being widely scattered, and busy with their special businesses, cannot give the time and attention necessary to hold railroad directors and officers to a proper accountability. The statement should usually be that they "do not" give the necessary time and attention, not that they "cannot." The reasonable performance by stockholders of their duty to themselves, supplemented by an enlightened public sentiment that would sharply condemn gambling and dishonest management, would go very far toward completely reforming the financial management of large corporations in this country. Public sentiment already has made the financial management of railroad corporations cleaner than it ever was before. Mr. Lane, and many others, believe, however, that there must also be, for the protection of stockholders and public, some kind of legislation for the regulation of security issues.

If there is to be such legislation by Congress, it should be more like the plan proposed by Mr. Lane than like the statutes relating to security issues in effect in either Massachusetts, New York, Wisconsin or Texas. All these laws tend to restrict railroad enterprise and to foster paternalism in government by transferring too much detailed authority over the roads from their responsible managements to public officials. The object should be to throw such light upon the financial management of railroads that it will be rendered easier for stockholders, public officials and the public to detect incompetency and dishonesty in the managements. Greater publicity would tend to increase public confidence in the securities of well-managed roads and to restrain investment in ill-managed roads. It would not entirely restore and sustain confidence, as Mr. Lane seems to think, even in the securities of well-managed roads, for investors have learned that they have more to fear from attacks by legislatures and commissions than they have from unwise and dishonest managements.

But is legislation necessary or desirable to secure the needed publicity and consequent reforms? No law for the regulation of industry that is not based upon long experience—preferably experience crystallized into custom—ever produces the effects, and only the effects anticipated. Even though the legislation favored by Mr. Lane seemed before its enactment invulnerable to criticism, its actual workings, under the diverse conditions of this big country, might prove very harmful, and once a bad law is passed it is usually hard to get repealed. Who can foresee, for example, the effects of requiring directors, under penalty of imprisonment, to apply every dollar raised for a certain purpose to that specific purpose alone? The Interstate Commerce Commission has strong recommendatory powers. Most railroads would act upon any reasonable suggestion that it should make regarding capital issues or any other matters. Why does not the Commission, instead of seeking constantly more and more legislation, invite railroad heads to confer with it regarding the proper practice in issuing securities, and expending and accounting for the proceeds, and after getting the benefit of collective wisdom on the subject, make recommendations as to the best practice to be followed? There would then be opportunity to test the policy recommended while avoiding the danger of having a vicious practice enforced by an inflexible and perhaps immutable law. We throw out this suggestion tentatively; but we believe it merits consideration. Certainly the Commission should make its recommendations slowly, and Congress should be still slower about enacting legislation that might affect the value of every bond and share of stock of American railroads now in existence or to be issued in future.

NEW PUBLICATIONS.

Railroad Reorganization. By Stuart Daggett. Harvard Economic Studies. Published by Houghton, Mifflin & Co., Park Street, Boston, Mass.; 1908. Cloth; 400 pages; 6x8¾ in. Price, $2.00 net.

In producing a thorough study of American railroad reorganization, Dr. Daggett has performed a task for which he is justly entitled to a great deal of praise. As he says in the bibliographical note in his conclusion, it is surprising that a field so rich as that of the history of American railroad systems should have attracted so little attention from competent students. We believe we are correct in saying that the work at hand is the only book extant on the subject of railroad reorganizations in this country, and it appears at a time when there is more railroad reorganization going on than there has been in a dozen years. Its utility is further heightened because the full discussion of the reorganizations that followed 1893 is followed by a history of the reorganized roads extending right up to the panic of 1907.

The book has two separate uses; it can be studied or it can be read. Those who are no longer in college will probably pass fairly rapidly over the details of each reorganization after the general idea is clear in their minds, unless they are concerned with a specific reorganization. In that case they belong in the class of students and not in the class of general readers. But the title of the book does not bring out the fact that there is presented a really admirable corporate history of the Baltimore & Ohio, the Erie, the Reading, the Southern and the lines which went to make it; the Atchison, the Union Pacific, the Northern Pacific and the Rock Island. We know of no better or easier way to get a quick grasp of salient points in the history of these roads than to read Dr. Daggett's book, even if the reorganization plans were to be skipped entirely.

For the banker, railroad officer or historian who wishes the details of all the reorganizations of these roads presented in an admirably concise manner, with just enough comment and not too much, the book stands in a class by itself. We were less impressed with the author's conclusion, in which he presents elaborate statistical groupings of the results arrived at in the separate instances. The value of the groupings is probably pretty slight, but the value of the individual facts, after they have been subjected to as careful a scrutiny as the author applied, is very great. That is to say, if the railroad chapters occupying 333 pages of the book have been carefully read, the conclusion may be omitted without sacrificing important information.

Dr. Daggett limits the term reorganization in his study to denote the exchange of new securities for the principal of outstanding unmatured general mortgage bonds, or for at least

50 per cent. of the unmatured junior mortgages of any company, or for the whole of the capital stock. The typical railroad reorganization occurs when a road ceases to be able to pay interest on its outstanding obligations, and the author names overcapitalization and competition as the two great fundamental causes of insolvency, and adds 10 other proximate causes which he quotes from Simon Sterne as follows:

1. The control of railroads by stock which represents little or no original cash investment.
2. The development of the territory served by individual railroads at a slower rate than is anticipated, and the influence of competition in reducing profits when the territory has developed.
3. The undertaking of railroad construction when there is considerable activity in the money market and when capital commands a high rate of interest.
4. The circumstance that railroads which lack reserve fund can never avail themselves of a cheap market for labor or supplies, but must always buy when everything is inflated, because then only can they float their loans and borrow capital.
5. The necessity of complete reconstruction within a brief period of most railroads built through new territory and the increase in funded and floating debt involved.
6. The growth of railroads beyond the ability to handle them.
7. The steadily increased expenditures required by law to accommodate the public.
8. The abuse of their position by directors and trustees.
9. The irresponsibility of railroad accounts.

To this list Dr. Daggett adds also the control of American railroads by foreign investors who apportion charges between operating and capital accounts in a way unsuited to American conditions.

When a road becomes insolvent the chances are that it has a good round floating debt, and the first question of reorganization is that of the cash requirements to pay off this debt and provide new working capital. The author points out that in general there are two ways by which this cash can be raised; by assessment on security holders and by the sale of securities. The securities of the road are usually particularly hard to sell at the time while the reorganization committee is working, and unless the reorganization is required by some extraordinary and temporary crisis instead of by chronic debility, these securities will be pretty apt to make fresh trouble before the road really gets on its feet again. This is assuming that they consist of additions to the debt of the road and not to its share capital. On the other hand, a cash assessment, while a heroic kind of treatment, invariably serves its purpose. It is compulsory, so there is no question of the yield to the railroad at market prices, and it entails no burden on the future, except that of the stock given in exchange for the payment, dividends on which are not a fixed charge.

If Dr. Daggett's book is taken seriously and studied as a treatise on reorganizations, and not merely as a history of a characteristic group of American railroad systems, it is hard reading; but it will very well repay the effort, and it is likely to remain the standard book on its subject for a great many years.

Brief on Railway Rate-Making Legislation. By Carman F. Randolph, New York. 88 pages; 9 x 6 in.

Rate making both by federal law and federal commissioned and by state laws and state commissions are discussed by Mr. Randolph. He finds that rate making by federal law is, of course, legal, as long as it is not a confiscation and is inclined to believe that Congress may pass a law that rates should be just and reasonable and appoint a committee to say what these just and reasonable rates shall be, but it is essential to the justification of rate making by commissions that the courts shall have the power of broad reviews. States in fixing intrastate rates often determine interstate rates as well. Mr. Randolph acknowledges this, but does not suggest any remedy. He does not believe that the federal government will take over the right to make intrastate rates, although he holds that the Interstate Commerce Commission has a right to overrule an intrastate rate which evidently affects interstate rates made by the Interstate Commerce Commission. The great objection to the federal government taking over the rate making power of the states is that most railroads are incorporated under state laws, and not under federal laws.

Letters to the Editor.

THE SANTA FE SHOP SYSTEM.

Kansas City, Mo., June 5, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The betterment work as introduced in the Topeka shops of the Santa Fe, which was so fully described in the *Railroad Gazette*, has doubtless attracted an unusual amount of attention from railroad officers, and it is probable that some of them may be considering the introduction of such methods in their efforts to reduce the labor charge for locomotive repairs. From the description of the manner in which the machinists are stimulated to the highest efficiency, one would naturally suppose that the cost of finishing the parts required for locomotive repairs at Topeka would be reduced to the lowest possible price. It would naturally follow that the railroad would concentrate at Topeka as far as possible all of the work connected with the finishing of material for locomotive repairs. It is surprising, therefore, to find that an outside shop in this neighborhood is now supplying the Santa Fe shop at Topeka with finished castings for locomotive repairs, from locomotive cylinders down to shoes and wedges. The reason for doing this must be because the Santa Fe road is able to purchase finished castings from the outside shop at a lower cost than it can finish them at its own shop, and as the outside shop is not equipped with machine tools which are any heavier, stronger or better in any way than those in the railroad shop, it follows that the outside shop must have some system of handling labor which is superior to that of the railroad. In other words, it would appear that, so far as machine work on locomotive castings is concerned, the betterment system at Topeka is beaten on its own ground. By a natural extension of the same principle an enterprising boiler maker should supply the Topeka shops with finished boilers, fireboxes and tanks at a lower price than they could be built by the railroad, and a forge and smith shop with a machine shop attachment, if properly managed, should be able to supply forgings at Topeka at less price than they could be finished there; and carried out to such a conclusion, the men at the Topeka shops would simply become fitters of finished work and few machinists would be required. The final outcome of such methods would be to send the complete locomotive to an outside locomotive shop for repairs, as has been done in large numbers in the past year by the Erie road and the New Haven.

To return to the present practice of furnishing the Topeka shops with finished castings, it will doubtless be interesting to railroad officers who have thought of introducing the betterment system to have some further information on this phase of the subject, since the conditions surrounding it at Topeka appear to be rather contradictory.

BONUS.

DESPATCHING BY TELEPHONE IN 1883.

New York, June 27, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

While looking over the matter relating to train despatching by telephone in your issue of June 26, it occurred to me that a brief note relating to an early use of the telephone for transmitting train orders might be of interest to your readers.

So far as I know trains were first despatched by telephone on the New Orleans & North Eastern in 1883. I had charge, as division engineer, of the location and construction of the northern division of this road and acted as superintendent for about a year after traffic service was installed. The telephone was at that time comparatively young, and long distance telephony was in the experimental stage. In order to keep in close touch with the resident engineers during construction, I proposed to have the right of way cleared at the beginning, and to erect a telegraph line upon which telephones should be installed at the office of each resident engineer. The scheme was regarded as of doubtful practicability by both the chief engineer and the president of the road, and I had some difficulty in obtaining their approval. The plan was carried out, however, the line being equipped with instruments specially provided by the Bell Telephone Company. The line worked quite successfully. When conditions were fairly favorable, conversation could be carried on between the terminal offices, a distance of over 80 miles, but it was often necessary to relay messages between distant offices. When track laying was in progress and construction trains were put on, instructions to these trains were given by 'phone. Later, when regular traffic trains were put on, the train orders were transmitted by 'phone, and as the service was extended and additional trains were added the sending of train orders by telephone was continued. Finally, four regular trains daily, as well as quite a number of work trains, were despatched by telephone—the four regular trains operating over about 100 miles of track.

The standard form of train order was used, and the orders were handled the same as by telegraph, except that, when repeated, all numbers, and the more important words were spelled out as well as spoken. The telephone was thus used exclusively for train orders for nearly a year, and no accident occurred that could be attributed to the use of the telephone instead of the telegraph.

The change from telephone to telegraph, when made, was effected almost instantaneously. After all preparations had been made, telephone service was discontinued at 11:55 a. m. on the day fixed, connections switched from the telephones to the relays at all the offices, a main line battery connected into the line, and at 12 m. tne despatcher began to send a train order by telegraph.

S. WHINERY.

DESPATCHING TRAINS BY TELEPHONE.

Harrisburg, Pa., July 1, 1908.

To the Editor of the Railroad Age Gazette:

I have read with interest the article, "Despatching Trains by Telephone," in the *Railroad Age Gazette* of June 26, 1908, particularly the paragraphs relating to the employment of young men who frequent railroad stations and the promotion of conductors to despatching.

I am ready at any time my superiors see fit to do my despatching by telephone, and shall do it as conscientiously as by telegraph and have no fear that it cannot be done as satisfactorily. However, there are several questions arising in this connection that should have further consideration before embarking in telephone despatching.

It should be noted that the Burlington used the best equipment to be had in installing its telephone system. Given a telegraph line with the same high-class equipment, would the telephone system then compare favorably with the telegraph? The telegraph lines are a fixture and it is notorious that nothing short of a sticky snow or a cyclone will give us up-to-date equipment. Fortunately, the road I work for has an up-to-date telegraph system, but with railroads in general this is an exception.

If I am correct, the operator on a telephone system hears nothing that occurs on the line until he is called to it by a bell. We pay operators to be "on the job" and find that a good operator is "on the job," and not only listens for his call, but hears all that occurs on the telegraph line, no matter what part of the office he is in. When your operator hears nothing that is going on on the line he is liable to become an automaton. Again, the bell may be heard half a block away. Perhaps your operator will find it convenient to answer his calls from a pool room or the corner grocery. Suppose he claims the bell did not ring, has the despatcher the evidence from the rest of the operators on the line that he did call, as he has on a telegraph line? I have no doubt that it is easier for a despatcher to ring a bell than to call an operator in Morse, but I doubt if it is conducive of better results for his employers. A good despatcher considers his convenience as a secondary consideration when serving his employers' best interests.

Again, is it possible with the system in use on the Burlington to have four or five operators receive an order simultaneously and check on each others' repeat without impairing the efficiency of the receiving instruments?

I can picture a condition where a few trains waiting for orders are held up for their meets while a conductor gets to the telephone and holds a conversation with the train despatcher. Every despatcher has frequent encounters with crews who cannot see beyond the confines of their own train and who insist on having their way. Co-operation with the operators and crews is necessary, but let us not confound co-operation with familiarity. "Familiarity breeds contempt," and a man has ten times to think before he telegraphs a cuss-word, and can say it ten times on a telephone (before thinking) in the same space of time.

I can readily see that the Burlington despatchers consider the new system a snap, as is stated. The equipment is all new, and as it has been in operation six months I presume they are still doing business with telegraph operators trained for the business. This brings us to the matter of securing telephone operators.

The man who becomes a telegrapher has enough stability in his make-up to stick to it until he has learned the business, and while he is learning telegraphy he is also acquiring a railroad knowledge, without crowding that part of his education. I have lived in several country towns myself, and it is invariably the young man with no inclination for work of any kind that hangs around the railroad station. He has not the grit to learn a profession, and frequently does not finish his common-school education. Is this the young man to place in a responsible position to handle train orders? The establishment of railroad telegraph schools has augmented the supply of telegraph operators, but it will be found that even they require two or three months' practice in a railroad office before they can qualify for a position. How many months' practice should a telephone operator have at this rate, and are there provisions for him to cut in on the circuit to get an idea of what he will be up against in real service?

The broadened field for securing train despatchers: I can see no objection to promoting a conductor to train despatching—if he can fill the bill. The reflection on the despatcher of to-day should be met. The despatcher is no theorist at all. He handles a great many trains, of numerous classes and a variety of conditions affecting each of them. The conductor's view is confined to his own train and his ability to get that particular train over the lines. We will assume that the best conductor on the line has been put on a trick—despatching. As he is above the average he will expect too much of the average conductor, and will be working at cross-purposes. The train despatcher of to-day knows just what each and every crew he handles will do under different conditions, and in practice it will be found that he is promoted because he took an interest in train movements and despatching before his promotion. With the telegraph he has had opportunities to follow up all his despatchers' train movements and do some thinking for

himself. This is hardly possible with a telephone line, as he would be neglecting other duties in order to cut in on the line.

Personally, I was promoted from telegrapher to chief despacher's chief clerk and then to train despatching, and am one of five despatchers who followed the same line of promotion and are in service to-day. This was a far-sighted arrangement on the part of the chief despatcher, and has proven the ideal education for a despatcher. As chief clerk, ample opportunity was afforded to view the work of other despatchers, to ride over the division and to work the train sheet, and I maintain that a greater part of this education could not be obtained under a telephone system.

Admitting that the talent of telegraph operators is decadent, does not the same condition exist with trainmen? With our people conductors have been tried out on a despatcher's trick, and it is significant that all our despatchers in service to-day have risen from the ranks of telegraph operators. If a superintendent has ever been a train despatcher he will admit that his experience with train crews has proven that they rarely figure on more than one train—their own—while on duty; and I would ask which is the greater theorist, one who has heard the arrangements made and assisted in the movement of many trains day by day, or one whose experience is confined to the execution of orders necessary to get himself over the line? This question admits of a great deal of argument which I would leave to older and more experienced men, who, I am sure, will silently, if not in print, refute that "theorist after all" idea.

WAYNE S. GRAEFF.

PREMIUM PLAN vs. PIECE WORK.

New York, July 3, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

Periods of financial or commercial depression always serve to attract sharp attention to the study of cost and expenses, and to stimulate, at least for a time, the enforcement of rigid economies. The gradually descending curve of combined shop efficiencies, which represents the unhealthy tendency of shop practice in prosperous times, must break, and be speedily restored to its higher and normal level. Nowhere is this more true at the present moment than with the railroads. All departments are affected, many innovations will be made, and, though it may be doubted at present, benefits will result which will have no small part in the return of commercial prosperity. At this time, among other things, the discussion of the most practical and beneficial method of wage payment comes prominently to the fore, for the reason that our industrial development depends, in part, upon the successful solution of the labor question.

That the day wage plan of payment is unsatisfactory and not apace with our development in mechanical equipment, etc., passes without comment, and the scrutiny of the fundamentals of different plans of labor remuneration becomes profitable.

The business slogan is "maximum output at minimum cost," and the degree which a road (or business firm) attains in this, marks its progressiveness. Its constituents are improved machinery, and their scientific operation (i. e., maximum speed and proper care), intelligent supervision, and a wage system that will induce the operative to put forth his best efforts.

Those systems of wage payment which are equally just to the employee and the employer, and encourage the former to his greatest moral, physical and intellectual development, are the only ones from which a satisfactory solution of the labor problem may be expected.

To our attention then come two distinct forms of wage payment, the straight or differential piece work system, and the premium or bonus plan.

While these two great systems are radically different in their fundamental theory and practical application, it seems to be the inherent fallacy of the average shop superintendent to consider each the same in the result to be obtained and only differing in method employed. This state of affairs is partially due to the fact that the premium system as applied to the railroad shop, is practically new in this country, though it has met with pre-eminent success where tried, while the piece work system has been tried with varied degrees of success for quite a period.

To prove that the premium plan is as different from piece work as from day work and more easily and satisfactorily installed and operated, is the first task, and to show that it extends a greater incentive to the workman, creates an esprit de corps among them with a more cordial feeling toward the management, and higher and more satisfactory returns to the company, is our second.

The premium and bonus plans advocated by different authorities vary slightly in their details, but here we shall consider only the basic principles.

Under any system of compensation, a workman is entitled to have extra effort recognized. Under the daily wage system the more efficient man is supposed to have a higher rate, but under this system even the exceptional man does not give more than mediocre efficiency. To secure high labor efficiency, the workman must have some incentive for his extra effort, and money furnishes that most effectually. This idea characterizes both piece work and premium systems.

Piece work is going to the other extreme from day work for the initial rate is generally based on the low efficiency of the shop prevalent at the time of the change, and hence as the operative becomes more expert, his earnings become prohibitive and he suffers a "cut."

The premium system is a mean between these two extremes, since the workman is always guaranteed his day wage at least, while the direct monetary gain incident upon an increased efficiency and output is divided fairly between himself and his employer.

The premium plan requires the establishment of a standard basis, in terms of hours allowed, for each operation, which standard basis once made should never be changed and has no relation whatever to the rate of wages paid per day to the individual workman. This time allowance is frequently called Standard Time and is the period in which the workman may reasonably be expected to complete the job; it is based generally upon average past records.

Should the task be performed in less than the time allotted, payment is made the workman at his regular hourly rate, plus a predetermined proportion of the value of the time saved, at the same rate. Should the time consumed be more than the standard set, he would receive his payment at his regular hourly rate.

If he consistently increases his efficiency, as is normally the case under the premium plan, his rate per hour is increased commensurate with the performance. For example, if a workman should increase his earnings 15 per cent. and maintain this increase uninterruptedly for two months, his rate might be increased, say 3 cents per hour. Thus, if the workman had been in a class where the rate was 35 cents per hour, he might, after such a performance, be advanced to the rate of, say 38 cents per hour.

It is obvious that a premium plan of this sort presents two strong pecuniary inducements to the workman to increase his efficiency:

First—To increase his earnings by the amount of premiums secured.

Second—To increase his day rate, by which means he would earn an increased premium for the time saved. For example, in the case of the operative receiving 50 per cent. of the value of the time saved below the standard time set, the premium would amount to 10 cents per hour saved where the hourly rate of the man was 20 cents, and to 20 cents where the hourly rate of the man was 40 cents.

Of course, should his earning power again fall for a considerable period to his former standard, his increase in hourly rate would be effective no longer. In actual practice, how-

ever, cases of this kind have been rare, for when a man can maintain his increased production for a period of two or three months, the likelihood of his falling to his former lower efficiency, with its consequent double loss of earnings, is remote.

The benefits accrue to the company principally, as with piece work systems, from the reduction of indirect cost. The overhead or expense rate for different shops ranges from 40 to 280 per cent. of the direct productive labor and may be considered normal at 100 per cent. in the average machine shop.

Assuming this percentage in the machine shop accurate enough for the purpose of illustration, and again assuming a 50 per cent. premium to the workman on time saved, it will be clear, with a little thought, that any saving of time under the premium plan, will return three times as much in profit to the company as to the workmen. The more premium a man earns, the more he returns in extra profits (lower costs) to his employer, and therefore it becomes good business to encourage steadily increasing efficiency, not occasional spurts, but a gradual trend to maximum proficiency, in which the plan of "hourly rate" increases plays an important part. A high rate of wages, based on a high rate of production, is the keynote of general prosperity.

In any individual instance the direct profit to the company for a certain time saving, may diminish slightly, as the workman's hourly rate is raised, but this is more than counterbalanced by the increased saving in indirect cost and the higher earning rate of the machine he works on. Also the psychological effect upon the shop of the skilled efficient operative doing conscientious work is to be considered.

In fixing time allowances, under the premium plan, years of experience have shown that the average time needed by the lowest rated man on the job, should be the basis. The policy with the most successful users, has always been to make the premium starting point low and the premium rate low. That a premium should be earned with very little extra effort by the average man put upon a job, is desirable. In the words of the superintendent of a large shop, "our men, without very much more effort than they had exercised under day wage, earned a premium, and when they eventually worked up to their maximum, the rate of premium which they were earning was not excessive and did not have to be cut so that the confidence of the employees from the start was established in the plan, and their heartiest co-operation secured."

The initial incentive that it is necessary to offer in piece work, is higher than it is economically possible to subsequently maintain. Such rates cannot remain permanent and a "cut" must come attended with all its disastrous features; the confidence of the employee is lost and his suspicion and antagonism aroused and the whole effect of the experiment is demoralizing.

On the other hand under the premium plan there is no reason for the employer to "cut the rate" which is paying extraordinary wages to the extraordinary workman, so long as he sees the benefit to himself growing under the premium plan. With every increase of the workman, his profits increase by a larger percentage. To repeat there cannot be an incentive for rate-cutting in the premium plan.

Nevertheless, shop atmosphere is permeated with the idea that an employee should not be allowed to earn too much. This has been due to the influence of poorly administered piece work systems and has been an obstacle to the progress of the premium plan. It has brought the piece work system into decided disrepute, and the confounding of the two systems, piece work and premium plan, has worked detrimentally to the latter.

Many railroads have considered the premium plan and have wished to try it, but hesitate to do so because they have ascribed to the premium plan the troubles of their neighbor on piece work.

The step at the installation of piece work is a radical one, and even the partial success of the venture depends upon accurate foresight and absolute justice in determining rates. The amount of work this entails in the compilation of data, etc., if the chances of subsequent failure are to be minimized, is enormous. Piece rates once established and put into use, the principal disturbing elements are the opposition of the labor unions and the tendency of the men to band together to curtail production.

With the installation of the premium system the step is not so radical. The change from day work is gradual. All workmen look upon innovations—even philanthropies—with suspicion, but when even the lowest rated man gradually sees that by a very slight extra effort he can earn some premium, the proposition becomes interesting to him. He gradually cuts out needless wastes in time, and applies his mind to his work with the result that his premium increases. Then right in the beginning perhaps he has an "off" day and his daily wage is coming to him just the same, which would not be the case under the piece rate plan.

The shop goes on operating under the premium plan, here and there a man changes his class, almost everyone is earning some premium. The workman sees that he may earn as much premium as he can and the company is satisfied; that there is no danger of a cut and no need of concealing two or three day's accumulated work in his drawer. He learns all this quickly and he sees that to earn a definite premium for a certain time, means a chance to earn a higher day rate and so more premium for the same effort. This destroys the last iota of suspicion, and there arises a mutual understanding between employer and employee.

The premium plan is well adapted to other work than that of the machine shop, and admirable results have been secured from the application to gang work in locomotive and car repairs. In the gang system, the rate is based upon the amount of product produced for the value of wages expended, the direct saving usually being shared equally between the company and the employees.

Under this system the two conditions which quickly come to prevail, are either that the output for a given number of men at work will be increased, or that the number of men will be reduced (the inefficient are dropped gradually) and the output maintained with a decreased force, the result in either case being the same, a saving in direct labor cost as well as in indirect cost. The gang premium system, inasmuch as it is based upon the total labor expended, attacks the labor cost as a whole, and develops the standard of efficiency of the entire force of the department.

In the increasing of efficiency the foreman's interest and efforts are enlisted by a premium or bonus to him, based upon the bonuses earned by the men under him. In some cases the bonus earned by the foreman is discounted for the occasional slumps in the efficiency of his gang. Cranemen and others in like capacity, benefit by a bonus, or premium, of a certain per cent. of the totals of the premiums earned by the men served.

In gang work piece work systems have never found a satisfactory place, in fact, the piece rate method of wage payment is only well adapted for highly specialized repetitive work.

That a railroad shop offers different problems than a manufacturing plant making constantly a standard product, and that difficulties arise in repair work which are not incident to the original manufacture, is well known. To the railroad shop, piece work cannot extend much help in the solution of the labor question. Only where a few standard products are turned out, can piece rates be determined, which are fair to both sides. The premium plan offers a real solution even in the case of continually new and different work, for if the time allowance be set too low, the man makes his day rate at least, if set too high, the results cannot be as disastrous under the premium plan as with piece work system.

Both systems give their greatest benefit to the employer in the reduction of indirect cost, but the premium plan while still giving the initial incentive to increase production, reduces

the direct labor cost also, which is beyond the power of piece work.

GUNN, RICHARDS & CO.

[We welcome this contribution from a firm which has much expert experience, and we hope that it will be productive of discussion. There ought not to be a shop manager in the country who is not following the progress of individual effort compensation in its various forms. As regards the specific point which our correspondents make, however, much of what is generally termed piece work in railroad shops possesses the premium plan characteristic of a guaranteed day wage, and the difference between this kind of piece work and the premium plan referred to seems somewhat exaggerated.—EDITOR.]

FREIGHT CLAIM ASSOCIATION.

The seventeenth annual meeting of the Freight Claim Association was held at Atlantic City, N. J., June 17, 18 and 19, President R. C. Richards (Chicago & North-Western) in the chair. Nearly 200 members were present, the largest attendance the Association has ever had. The President in his address said:

"The Freight Claim Association was organized at Chicago in 1892 with a membership of 97. Now the membership is 343; new members last year, 36; receipts $6,185, disbursements $5,948, mileage 213,700, representing practically all the steam carriers in this country, Canada and Mexico.

"* * * During the past year there were submitted to the Arbitration Committee 216 claims. In 39 cases appeals were applied for, of which 25 were granted. The amendment to Section 20 of Article VII. proposed by the Committee on Constitution and By-Laws will, I trust, receive the favorable attention of the Convention. The matter of relieving the President and Vice-Presidents of the disagreeable, as well as delicate, necessity of stating when they grant an appeal that the decision of the Arbitration Committee 'is manifestly contrary to the Constitution, Rules and Rulings of the Association' cannot be too strongly urged upon members. As long as the Association has an Appeal Committee any member aggrieved by the decision of the Arbitration Committee should have the right of appeal. * * *

"The amendments recommended by the Joint Committee to Loss and Damage Rule 41 and Overcharge Rule 24 are in the line of progress and, I believe, necessary to their proper enforcement. Practically all of the present opposition of these Rules comes from members who have failed to comply with them or give them a fair trial. As they are the only rules of the Association providing a method for the investigation of claims, there would seem to be no good reason why members who wish to and do comply with them should be expected or required to adopt any other method of investigation and adjustment of claims. If members can arbitrarily refuse to comply with some one rule that they do not happen to approve of, although adopted by the Association by a two-thirds vote after long consideration and discussion, why may not any member do the same thing with any other rule of the Association that it does not approve of? If this course is persisted in the result must be the disruption of the Association.

"From personal experience with the rules, I know they will accomplish the desired object, viz., the prompt adjustment of claims. Compliance with their provisions will reduce the time taken to investigate and settle claims from 50 to 80 per cent. of what the old method required, and I believe every member who has given the rules a fair trial will bear me out in the opinion that they are not only practical, but the best and quickest method so far proposed to promptly and economically investigate freight claims. They are an absolute preventive of the loss of papers and the delay, trouble, annoyance, friction and loss of patronage caused by the duplication of papers. * * *

"The adoption of some proper method for the prevention of overcharges should receive the earnest and thoughtful attention of this Association. Owing, as I am informed, to the rulings of the Interstate Commerce Commission, many complications and resulting delays in the adjustment of such matters have occurred, to the serious annoyance of our patrons. On account of my lack of experience in the handling of claims of this kind, I feel a great diffidence in making suggestions in the matter, but it does seem to me that by a proper revision of the waybills in the Freight Auditor's office many of these overcharges could be discovered and, when found, immediately refunded, thereby saving the expense of handling the claim and doing away with all delay. And then if some practicable scheme could be evolved by this Association and recommended to the Association of American Railway Accounting Officers by which universal through billing could be made for all interline shipments, the enormous expense of making annually millions and millions of unnecessary waybills at transfer points would be saved to our companies, the risk of loss and damage (which we all know is constantly increasing) occasioned by the making of mistakes in rebilling at such points would be avoided, and at the same time there would be placed in the possession of the delivering carrier the original document on which the shipment was transported, so that if any loss or damage occurred to the consignment or any controversy arose about its delivery, the destination carrier would have the original and necessary information upon which to act. I am sure that the time is opportune for action and I believe that this Association is broadminded enough and strong enough to solve the question.

"The report of the Committee on Overcharge Rules on the various questions presented to it for consideration, and especially on the question of returning shipments which through error or oversight of carriers' agents have been erroneously billed, should have careful consideration; also the report of the Committee on Methods and Topics. The Association may wish to consider the report of the meeting of the General Managers' Association of the Southeast, April 9. The highest and most important duty of a Claim Agent is to do what he can to prevent losses and damage by calling attention of the Operating Department to the causes which bring them about. While proper attention is not always given to such suggestions the alarming increase in amount paid out in settlements will, sooner or later, compel attention, and we will, at least, have done our duty." * * *

On the morning of the second day the Association listened to an interesting address by Prof. Henry C. Adams, of the Interstate Commerce Commission. "Considerable was said last year," he remarked, "about the relation of this Association to the Accounting Officers' Association, and it was suggested that a certain degree of permanent relationship was intended by the manner in which the Commission was adjusting its accounting schemes. If that was ever interpreted as meaning in any way to deprive any association of the full and complete exercise of its responsibility in view of the work that is assigned to the members of that Association by their corporate interests, such impression was wholly mistaken.

"The relation which the accounting schemes bear, from a public point of view, is that the expenses of carriers shall be recorded on the same basis, that the tariff rates as promulgated shall be collected; that no more than tariff shall be collected, and that that tariff, when collected, shall be properly apportioned, so that the tariff rate collected will be the revenue earned by individual carriers. It is along these lines and for that reason that it has seemed proper to say that, in part, the question of claims is a question of accounting. So far as the Commission is concerned," said Mr. Adams, "although, of course, I am not at liberty to express opinion for them, I am confident that they would be only too glad to cooperate with this Association to make universal any reasonable and just requirement in regard to claims, recognizing, however, the fact that the Commission can only go so far in

this matter as the law upon which it acts gives it power or authority to act."

Mr. George D. Dixon, Freight Traffic Manager of the Pennsylvania Railroad, sent a letter urging prompt settlement of claims. He said:

"In considering the question of prompt settlement of claims as between two or more railroads there can be but one question before us, namely—

"Is the claim a just or reasonable one, or is it not?

"After this question is determined only two courses of action are possible:

"First—If the claim is just, pay it at once.

"Second—If not just and reasonable, decline it at once.

"Unjust and unreasonable claims have materially increased of late, but this is no excuse for delay in prompt investigation and decision. Look at the question from the shipper's point of view. I am aware that a great many claims are settled promptly, often immediately, but improvement is needed. Claims arising out of a movement between two points on the same railroad, we should either pay or decline within thirty days, provided there is no unusual complication. The carriers should arrive at a definite basis of co-operation for the investigation and settlement of claims arising out of a freight movement over two or more lines, and all joint claims should be paid or declined within sixty days, provided there is no unusual complication. It is true that the facts in many cases are difficult to establish, and that the present rigid Federal laws make it important that in making an apparent refund it must be in accordance with the laws, yet I believe that exceptions to the observance of this time limit of sixty days should be extremely few in number."

The meeting heard and discussed the reports of six standing committees, namely: on Constitution and By-Laws, on Loss and Damage Rules, on Overcharge Rules, on Uniform Blanks and on Methods and Topics. The main interest of the session centered about the new plan of interline claim settlement adopted at Denver last year, and which is embraced in present Loss and Damage Rule No. 41 and Overcharge Rule No. 24 of the Association, and in certain amendments to Loss and Damage Rule No. 40. This "plan" has now been in operation since September 1, 1907, and is generally conceded to be the best so far tried, many of those who at first opposed it being now enthusiastic in its favor. It has, nevertheless, to be admitted that some of its features are objectionable to many of the members and strong effort was made at this session to supply a remedy. The discussion bore chiefly upon:

First—The question of direct investigation by settling carrier.

Second—That of whether a claim shall be charged out to each interested carrier or, instead, the whole amount charged out to the next connecting carrier, this latter being a particular feature of the so-called "Chambersburg Plan," which was offered in substitute by Mr. J. L. Eysmans, General Freight Agent of the Cumberland Valley.

Third—That of how the money shall be collected, i.e., monthly draft settlement or the old plan of voucher.

A vote was finally taken upon these three questions, with the following result: With respect to the first question, the rule remains as it now stands, that is to say, direct investigation left optional. In regard to the second question, the rule remains unchanged. In connection with the third question, the rule remains as at present, it being understood that draft settlements are not mandatory. A few other minor changes were made in the rule.

Loss and Damage Rule No. 40 was amended to read as follows:

Claim for conceded loss not exceeding $20, where the record at destination is clear; that is, delivered in good order and no indication of robbery existing (affidavits of shippers and consignees at the option of paying carrier), and claim for concealed damage not exceeding $20, shall be prorated from point of shipment to destination without investigation, but in absence of affidavit, signed statement must be secured from shippers, consignees and all draymen in support of the claim. In either case, carrier against whom claim is presented shall have full authority to determine as to settlement.

Claim for loss of an entire package, or for loss from a package, or for visible damage not exceeding $20, shall be prorated from originating point to destination unless notations appearing on way bill at destination locate the loss or damage, in which event claim shall be prorated from point where last checked without exception to point where loss or damage was first discovered, the notation of transfer or exception to determine the checking in transit, evidence satisfactory to the adjusting carrier being furnished that the propery for which claim is presented to the initial carrier in good condition and was not so delivered at destination. Any facts developed by further investigation to be disregarded.

All loss claims under this Rule shall be prorated on revenue basis and all damage claims on mileage basis, subject to Ruling W-2, minimum distance for any carrier to be ten miles.

This Rule to apply on all unsettled claims.

An interesting report was presented by the Committee on Methods and Topics, dealing with the prevention of loss and damage claims, the classification of such claims and uniformity in adjustment of claims for concealed losses.

The following officers were elected for the ensuing year:

President, Daniel Mowat, General Freight Agent, Toledo, Peoria & Western, Peoria; First Vice-President, J. S. Tustin, Freight Claim Agent, Missouri Pacific, St. Louis; Second Vice-President, John B. Brownell, Auditor of Revenue, Delaware & Hudson Company, Albany; Secretary and Treasurer, Warren P. Taylor, Traffic Manager, Richmond, Fredericksburg & Potomac, Richmond. Mr. Taylor begins his twelfth term.

The chairmen of the commitees are: Arbitration Committee, George C. Arnold, Lehigh Valley; Review Committee, W. B. McKinstry, Central of Georgia; Appeal Committee, J. J. Hooper, Southern; Executive Committee, President Daniel Mowat, R. L. Calkins, John T. Deniston, R. C. Richards, W. H. Hancock, R. Kirkland, J. J. Hooper, A. A. Martin. After some discussion, it was determined to hold the next annual meeting at Old Point Comfort on Wednesday, June 16, 1909.

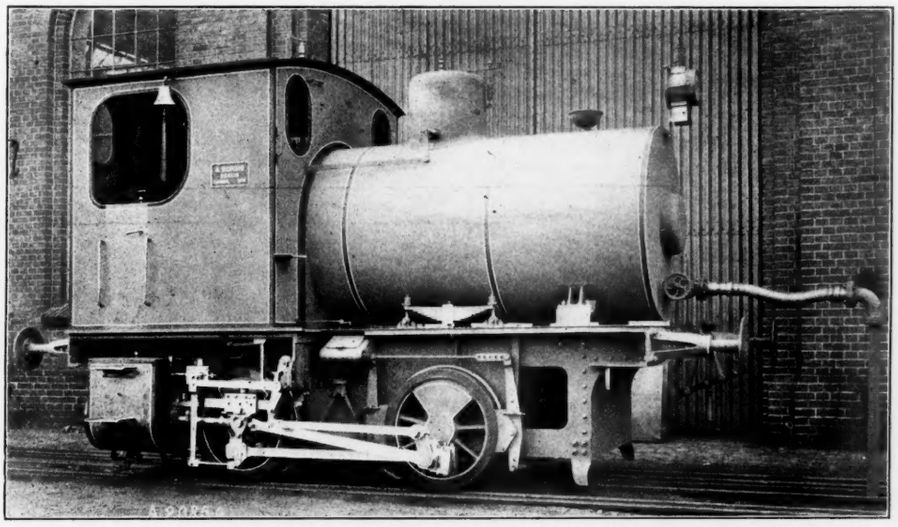
THE FIRELESS LOCOMOTIVE.

The application of the principles on which the fireless locomotive is based is not particularly recent. In years gone by there have been isolated cases of constructions in Germany in which they have been used, but only in recent years has the value of this style of motor been recognized and properly appreciated. At first there was a mistaken notion that motors of this type could be used successfully in the regular operation on light railroads, and only after the recognition that the field to which they were peculiarly adapted was the more or less intermittent switching service of industrial establishments, has their use spread.

The fireless locomotive is similar in appearance to an ordinary locomotive, except that it has no firebox. The boiler is replaced by a cylindrical tank closed at both ends. A store of power is supplied at intervals from the outside, i. e., high pressure steam from a stationary boiler. The tank or receiver is its principal feature. This is made of boiler plate. A manhole gives access to the interior, which is divided into several compartments by perforated transverse portions, the object being to reduce the violent oscillation of the water contained incident to sudden stoppages in switching. In addition the receiver is equipped with a steam dome containing a regulator for controlling the admission of steam to the pipes leading to the cylinders. It is also furnished with a water gage, a steam gage, a safety valve and a whistle. To admit steam into the receiver an inlet valve is provided which connects with a pipe placed in the lowest part of the receiver, which is perforated with a multitude of small holes.

To charge the receiver with power a quantity of water, varying with the capacity of the receiver, is run in, a mark on the water gage indicating the proper level. Next the inlet is connected with the steam supply pipe from the boiler plant; the valve is opened and steam enters. The steam

passes in fine streams through the perforated pipe into the water, which it heats, and is itself at the same time condensed until finally the temperature in the boiler and that in the receiver and consequently the pressures in the boiler and in the receiver have become nearly the same. The receiver has then become charged. By the condensation of steam the original volume of the water in the receiver has increased and now fills about three-quarters of the capacity, the remaining quarter being occupied by steam. The inlet valve is closed and the locomotive is ready for work. It is hardly necessary to say that the receiver is thoroughly covered with nonconducting material to reduce to a minimum loss by radiation of heat. When the locomotive is not working this loss will amount to from 4 to 8 lbs. pressure an hour, depending on atmospheric conditions. The time required for charging is 8 to 15 minutes, depending on the size of the receiver and assuming that the boiler plant is of sufficient capacity.



Charging Borsig Fireless Locomotive.

In performing work this locomotive differs from the ordinary type in that it works with a steadily decreasing pressure. The steam that was charged and in charging was condensed to water, is again converted into steam, is used up in work and when the pressure has reached the point at which effective work can no longer be done, the volume of the water in the receiver has decreased to approximately the same as before charging, and a fresh charge of high pressure steam is introduced. This characteristic renders necessary a generous size for the receiver and calls for steam cylinders of comparatively large diameters. These latter are so proportioned that with 45 to 60 lbs. pressure the full tractive power of the engine can still be utilized, and with 4 to 8 lbs. pressure the locomotive can propel itself to the charging station.

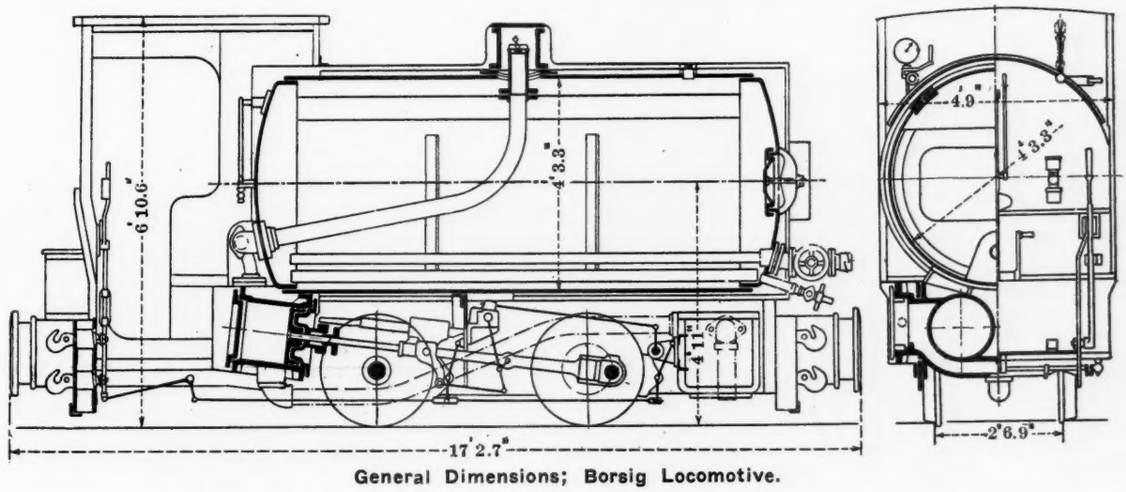
The works of A. Borsig at Tegel manufacture 7 types of fireless locomotives, the principal requirements and dimensions of which are given in the accompanying table.

The accompanying illustrations give the general appearance and dimensions of the Borsig fireless locomotive.

Taking type VI., which has a receiver of 318 cu. ft. cap., and containing 200 cu. ft of water, with initial pressure at 165 lbs. and end pressure at 30 lbs., the charging would require 2,587 lbs. of steam, and assuming an average consumption of 49 lbs. per h.p. per hour, this charge could perform work equal to 53 h.p. nours.

The advantages claimed for the fireless locomotive are absolute absence of danger of fire, no smoke or soot, and economy in power (steam can be produced in a stationary boiler plant much cheaper than on a locomotive), simplicity in operation, low repair costs, no wire conductor for power, and no danger of explosions.

	I.	II.	III.	IV.	V.	VI.	VII.
	At least	At least	At least				
Gage	1 ft. 11½ in.	2 ft. 4½ in.	2 ft. 10½ in.	4 ft. 8½ in.	4 ft. 8½ in.	4 ft. 8½ in.	4 ft. 8½ in.
Diam. steam cyls..	7.27 "	14.2 "	16.5 "	14.2 "	16.5 "	16.5 "	16.5 "
Stroke	11.8 "	11.1 "	15.75 "	11.85 "	15.75 "	15.75 "	21.65 "
Diameter drivers..	23.6 "	24.6 "	31.5 "	27.6 "	33.25 "	33.25 "	39.4 "
Max. steam press...	180 lbs.	180 lbs.	180 lbs.	180 lbs.	180 lbs.	180 lbs.	180 lbs.
Cap. of receiver...	71 cu. ft.	119 cu. ft.	159 cu. ft.	106 cu. ft.	159 cu. ft.	318 cu. ft.	494 cu. ft.
Weight, empty....	5 tons	9½ tons.	12½ tons	10 tons	13¾ tons	18½ tons	20 tons
" charged...	7¼ "	12½ "	16½ "	12½ "	17½ "	26 "	31 "



General Dimensions; Borsig Locomotive.

COURT DECISION IN STOCK YARDS $2 RATE CASE.

The following is the complete text—with the exception of some historical data—of the opinion rendered by the United States Circuit Court for the District of Minnesota, Third division, holding illegal the order of the Interstate Commerce Commission for a reduction of the live stock terminal charge at Chicago from $2 a car to $1, and enjoining the Commission from enforcing its order:

Alpheus B. Stickney and Charles H. F. Smith, Receivers of the Chicago Great Western Railway Company, et al., complainants, v. the Interstate Commerce Commission, defendant. In equity. Before Sanborn, Hook and Adams, Circuit Judges.

Circuit Judge Adams delivered the opinion of the court.

This is a bill in equity brought by the railroad companies which are complainants against the Interstate Commerce Commission to enjoin the enforcement of an order made by the latter requiring them to desist from charging $2 per car for transporting live stock brought from outside the state of Illinois, from the ends of their roads in Chicago to the Union Stock Yards, and not to exact for that service hereafter a greater sum than $1 per car. * * *

The pleadings and exhibits disclose that since the year 1894 the Interstate Commerce Commission has frequently had the question of the above mentioned terminal charge before it and has repeatedly ordered its reduction from $2 to $1. * * *

In view of the protracted history of this case we find it unnecessary to restate many of the facts. By referring to the opinions of the courts, and particularly to that of the Supreme Court of the United States in I. C. C. v. Chicago, etc., R'd 186, U. S. 320, all essential detail can be found. For our present purposes it is sufficient to say that it stands conceded by the pleadings that the actual cost to complainants of carrying live stock from their respective terminal yards at the ends of their lines or roads in Chicago to the Union Stock Yards exceeds the sum of $2 per car. This expenditure is for trackage from the ends of their rails over the track of the Union Stock Yards & Transit Company and making deliveries of the stock at the stock yards and is for a service totally distinct and separate from that involved in the transportation over their own lines to the ends of their rails. As such terminal service it was required by the original interstate commerce act (24 Stat. 379, Sec. 6) and by the amended act of June 29, 1906 (34 Stat. 584, Part 1, Sec. 6) that it should be separately scheduled by the carriers. The original act provided that the published schedules of rates, fares and charges "shall also state separately the terminal charges," and the amended act emphasized this requirement by the use of the following language: "The schedules printed as aforesaid * * * shall plainly state the places between which property and passengers shall be carried and shall * * * state separately all terminal charges. * * *"

Prior to 1894 the railroad companies made no additional charge for transporting live stock from their own terminals in Chicago and delivering the same to the Union Stock Yards. The rate fixed and charged for transportation from the points of origin of the freight to the ends of their own rails in Chicago included all the compensation they received for the service of delivery at the stock yards, but in that year the Union Stock Yard & Transit Company made a trackage charge for the use of its tracks for that service ranging from 80 cents to $1.50 per car according to the extent of the track used by the different roads respectively. This additional burden, and the enhanced complexity and general cost of the special service, according to the averments of the bill, "made it impracticable to continue to make deliveries beyond the lines of their respective railroad tracks without any charge or compensation therefor." For these reasons, as averred, the railroad companies laid a charge for it of one uniform price of $2 per car and undertook to conform their published schedules of rates and charges thereto. The Court of Appeals for the Seventh Circuit and the Supreme Court twice justified the imposition of the extra charge on the ground, generally speaking, that the carriers had a right to segregate the terminal charge in question from the other rates over their main lines, and had done so, and that they had a right to make an additional charge not exceeding the cost thereof for that service, and that the charge of $2 a car as laid was just and reasonable and should be sustained.

The Supreme Court held that the carriers had the right to divide their rates so as to make a distinct charge for service from the point of shipment to Chicago and a separate charge for service in transporting and delivering live stock from their own terminals to the Union Stock Yards, but held that they had not made such a division by any such clear and plain statement as is required by the interstate commerce law. After referring to the provision of law requiring the separate statement of terminal charges the court said: "The purpose of this provision was to compel the schedules to be so drawn as to plainly inform of their import, was to exact that when the rates were changed the change should be so stated as not to mislead and confuse." The conclusion reached was that the carriers in this case had not made the required division and separate statement of their terminal charges; that all they had done was to add the sum of $2 to the prior through rate, which up to that time had embraced the terminal charge. Mr. Justice White, speaking for the court, said: "We think that it cannot be said that to add an additional amount to a former charge was necessarily to divide such former charge without holding that to add one sum to another is necessarily to divide the other." Notwithstanding this conclusion, the judgment of the Court of Appeals was affirmed on other grounds. The opinion concludes as follows: "We think, however, in view of what has been said, and in order to prevent all possible misconception, that it should be stated that nothing in the decree refusing to execute the order of the Commission should be construed as preventing that body, if it deems it best to do so, from hereafter commencing proceedings to correct any unreasonableness *in the rate resulting from the additional terminal charge* as to any territory to which the reduction referred to in the opinion, if any such there be, did not apply."

Adopting the suggestion of the Supreme Court the carriers soon thereafter made an amendment of their published and filed schedules and by clear and unequivocal language segregated the terminal service from the transportation over their main lines to Chicago, and definitely fixed the rate for the separated terminal service at $2 a car.

In view of the right and duty of the carriers to make a segregation, and of the fact that one has been actually made, and of the further fact that the charge laid for the separate terminal service is in itself just and reasonable, not more than the actual cost thereof, it would seem to follow that it should not be reduced. Neither the Commission in its reports, nor learned counsel in their argument, attempt to justify the reduction on the ground that the charge as actually laid was too much for the particular service rendered, but solely on the ground that if the charge of $2 a car for the terminal service should be allowed even though it be only a just and reasonable compensation therefor, the result would be that the rate from the origin of shipment to the ends of the rails in Chicago would become too high, and thereby the cost of transportation from the origin of shipments to the Union Stock Yards would be excessive.

It is said that the carriers for many years before 1894 made no separate charge for the terminal service in question, but absorbed it in the through rate, and that the present published and filed rate for the service on the main lines only, that is, the service to the end of complainants' lines in Chicago, excluding the terminal service, is the same as it then was. The conclusion drawn is that because the carriers are now charging $2 more than they once admitted was just and reasonable for the entire transportation, including the terminal service, the imposition of the terminal charge is a mere unwarranted addition to a just and reasonable charge and is accordingly unjust and unreasonable.

The logic of this argument is somewhat impaired by the concession that the carriers may by reason of the trackage charge ranging from 80 cents to $1.50 per car made by the Union Stock Yards & Transit Company, add to the through rate the arbitrary sum of $1 per car for a terminal charge. If the old through rate is not conclusive of the reasonableness of the terminal charge it is obviously left open to every consideration affecting its reasonableness; not only the trackage charge, but the other facts which create the complexity

and affect the general cost of the terminal service referred to in the bill, should be considered.

The interstate commerce law confers the power upon carriers to determine for themselves the rate of freight between points on their lines, and the terminal and other charges which they will make for services beyond their lines incident to transportation. Carriers may in this manner make such propositions for business as they please, but when they make them they must, until they are changed by themselves or by the Commission, strictly observe them or suffer the pains and penalties of the law for disobedience. In the exercise of their power and obedient to their legal duty the carriers fixed and published the terminal charge in question, for service beyond their lines rendered necessary to complete the transportation undertaken by them. They made this a separate matter, as they had the undoubted right under the law to do, and, in our opinion, neither the Commission nor the courts have a right to complicate it with any other service in determining the reasonableness of a charge fixed for it.

The various provisions of the interstate commerce law requiring separate statements and schedules of all kinds of service, and imposing penalties for failure to observe them, seems to us to necessarily place them apart and make each stand by itself when assailed as unlawful. This, of course, does not prevent consideration of all pertinent surrounding circumstances when any particular service is drawn in question.

It follows, we think, that the reduction of the terminal charge below its cost or below its just and reasonable value for the purpose of correcting the through rate was erroneous. The Commission, in our opinion, had no power after the legal separation of the two services, to make the terminal charge unreasonably low merely because the tariff for the through rate was unreasonably high. If the latter were true, the remedy was to reduce it by a direct proceeding instituted for that purpose. On the conceded facts of this case we think the Commission misconstrued the law.

But it is argued that the power to prescribe the maximum rates for service is conferred upon the Commission exclusively; that when in *its opinion* an existing rate is unreasonable the power to prescribe a maximum rate for two years to come arises, and that whether the opinion reached by the Commission be right or wrong it is not under any circumstances reviewable by the courts.

With this contention we find ourselves unable to agree.

As a result of the well-remembered, protracted and able debates in Congress when the Hepburn bill was under consideration, concerning the question of a judicial review of the work of the Commission, the following provisions were embodied in the act:

"Sec. 15. . . . All orders of the Commission, except orders for the payment of money, shall take effect within such reasonable time, not less than thirty days, and shall continue in force for such period of time, not exceeding two years, as shall be prescribed in the order of the Commission, unless the same shall be suspended or set aside by a court of competent jurisdiction.

"Sec. 16. . . . The venue of suits brought in any of the courts of the United States against the Commission to enjoin, set aside, annul or suspend any order or requirement of the Commission shall be in the district," etc. . . . "and jurisdiction to hear and determine such suits is hereby vested in such courts," . . . "provided, that no injunction, interlocutory order or decree suspending or restraining the enforcement of an order of the Commission, shall be granted except on hearing after not less than five (5) days' notice to the Commission."

The defendant is a legislative Commission empowered to discharge certain duties of a judicial character; among others, to determine and prescribe what are just and reasonable rates for carriers of interstate commerce to charge for the different kinds of service which they are authorized to perform for the public; that is, to determine and prescribe what may be the maximum of their charges for through transportation, terminal, storage, icing and other services incidental to transportation.

Being a Commission of the character just represented, we perceive no reason why the courts may not at least treat its proceedings as they do the acts and proceedings of other quasi-judicial bodies, created to perform executive or legislative acts involving inquiry into facts and application of law thereto. The finding of facts on controverted and conflicting evidence by such bodies when not brought about by fraud or mistake is generally conclusive and ought not to be disturbed by the courts; but when facts found, conceded or established without dispute admit of but one legal conclusion and a different and erroneous one is reached by reason solely of a misconception and misapplication of law by such bodies their action is subject to review and may and ought to be avoided by the courts. James v. Germania Iron Co. 46 C. C. A. 476, 107 Fed. 596; Johnson v. Towsley, 13 Wall. 72; Moore v. Robbins, 96 U. S. 530.

We refrain from expressing any opinion concerning what other jurisdiction, if any, is conferred upon this court, by the broad and comprehensive language quoted above, authorizing it "to enjoin, set aside, annul or suspend any order or requirement of the Commission." All we are required now to hold, and all we do hold, is that this court has ample jurisdiction to set aside or suspend any order of the Commission resulting from a misconception and misapplication of a law to conceded or undisputed facts.

Applying the foregoing doctrine to the facts of this case we think the learned Commission fell into a mistake of law in attempting to correct the through rate by reducing the terminal charge itself below its just and reasonable value. That being a separable and separate service, actually segregated by proper action of the carriers from the rate over their main lines, it must, in our opinion, stand or fall upon its own merits, irrespective of whether the other rates are in themselves just and reasonable. If they are not just and reasonable appropriate proceedings should be instituted to make them so. Such, we think, is the meaning of the Supreme Court expressed in the latter part of its opinion above referred to. It there reserved the right to the Commission "to commence proceedings to correct any unreasonableness in the rate *resulting from the additional terminal charge*," etc. If by the separation of and separate charge for the terminal service the balance of the rate from the origin of shipment to the stock yards is in the light of former charges or for any other reason too high, the remedy should be applied directly to it without disturbing the rate which is not too high.

Counsel for the Commission again suggest rather than seriously argue, we think, that no rate prescribed by the Commission for any service can be set aside or suspended unless the complaining carriers make it appear that the enforcement of the rate challenged will render the business of the carriers throughout their whole line unprofitable. Our attention is called to the case of St. Louis & San Francisco Railway v. Gill, 156 U. S. 649, as authority for this suggestion. Without stopping to analyze the Gill case to show its inapplicability to the case before us or to consider the proposition advanced by counsel at any length, we content ourselves by saying that it seems utterly untenable. The provision of the interstate commerce law requiring carriers to segregate certain incidental services rendered by them from the principal service of transporting merchandise over the main lines of their roads, and requiring them to affix thereto a distinct and separate charge which in itself must be just and reasonable, is inconsistent with counsel's suggestion. We cannot conceive that Congress ever intended by the legislation in question to subject railroad companies to the necessity of an accounting concerning all their business throughout their entire lines in order to secure proper compensation for an icing, elevating or terminal service. An intention involving such an impracticable result should not be lightly imputed to Congress.

Some other arguments are made in support of the contentions of each side, all of which have received careful consideration, but as the result reached by us necessarily follows from what has already been said, we refrain from prolonging this discussion further. The temporary injunction prayed for, suspending until the further order of this court the order of the Commission reducing the terminal charge in question from $2 to $1, will be made; but we will require as a protection to shippers that the several complainants keep an accurate record showing the number of cars of live stock transported by them respectively over the terminal road in question to the Union Stock Yards, together with the dates of such transportation, the names of the respective consignors and consignees, the charges made by the respective complainants for such terminal service and the charges prescribed therefor, at the time such service may be rendered, by the Interstate Commerce Commission, and hold the same subject

to such orders as this court may hereafter make with respect thereto. We shall also require that complainants furnish a bond in the penal sum of $100,000 conditioned that they will comply with the orders made upon them and pay such damages as shippers may sustain by reason of the injunction.

A. H. JOHNSON'S ELECTRIC SWITCH AND SIGNAL APPARATUS.

BY GUY W. WYLES.

Mr. A. H. Johnson, Signal and Telegraph Superintendent of the London & South-Western, has recently brought out a system of electric interlocking in which direct current at 100 volts is used for the operation of switches and signals. "Indications" are obtained by changing the direct current first into a pulsating current and then transferring into an alternating current which is supplied to an induction motor.

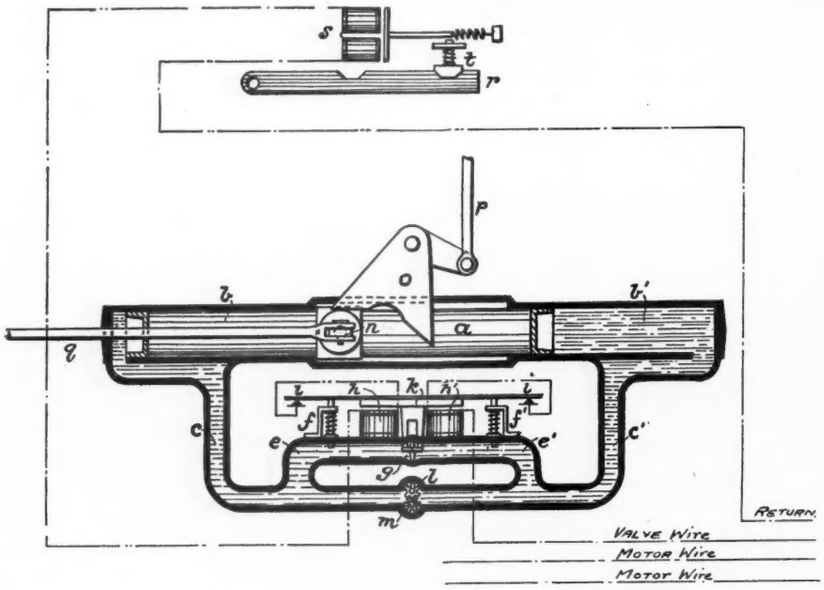


Fig. 1—A. H. Johnson's Electric Switch Movement.

The switch motors have two field windings, one for normal and the other for reverse operation. The apparatus for operating the switch points is unique, in that all of the working parts are submerged in oil which is itself the means whereby the rotary motion of the motor is changed to a reciprocation motion to throw and lock the points.

Fig. 1 shows the switch movement diagramatically. In this drawing *a* is a double-ended ram working in chambers *b* and *b'*; *l* is a rotary gear operated by the motor which is connected to the shaft *m*; *c* and *c'* are pipes leading from the chambers to the rotary gear; *e* and *e'* are the pipes forming a byepass which is opened and closed by the gate valve *g*. This is held closed by electro-magnets *h*, *h'* and armature *k*. In the byepass are two small plungers, *f* and *f'*, which are normally held down by springs. If, however, the pressure should rise abnormally as would happen if a train should stand on the detector bar or the points were jammed, one of the plungers would rise and break the circuit of the electro-magnets *h* and *h'*, thus releasing valve *g*, which would open the byepass. Electro-magnet *s* controls the lock *t* and the duplex bolt *r*; *n* is a roller which works the escapement crank *o*, to which is attached the throw rod *p*. The detector bar and facing point lock are worked by the rod *q* which is attached to a pin on top of roller *n*. The operation is as follows: Current is delivered to the motor and to the valve and bolt lock simultaneously closing the bye-pass and releasing the bolt. The gear wheels force the oil from one ram chamber to the other, thereby causing the ram to traverse its stroke. At the end of the stroke the pressure in the chamber is increased; this forces out one of the small plungers *f*, *f'*, breaks the circuit of the valve magnets and the bolt lock, and so releases the radial gate valve. This opens the bye-pass, allowing the motor to run at full speed. This free running of the motor is used to operate the indicating apparatus. Should anything be standing on the detector bar, or should the switch points be obstructed, the valve would be released in the same manner, permitting the motor to run at full speed, so that no damage would result. The motor has been run with the points obstructed for three hours, at the end of which time the apparatus worked correctly when the obstruction was removed.

The cogwheel oil and piston combination forms a new mechanical movement. It should be noted that the gear wheels drive the oil much as they would a solid rack, except that there is a small slip due to leakage past the cogwheels. In other words, the action is not that of a pump, as would at first appear. The driving slip is beneficial in meeting abnormal stress. A complete switch movement in place is shown in Fig. 2.

Fig. 3 shows a circuit diagram for the switch movement. To reverse the points the operation is as follows: Lever *l* is pulled to position *l''*; current then flows from battery *o* through main switch *a*, contact *f*, spring *c*, contact *i*, primary *j* of a transformer, wire *1* to the bolt lock coil *w* and valve coils *v* through contacts *u* and *u'* to common return *3*; simultaneously current flows through contact *e*, spring *d*, contact *k*, wire *2* to motor field *t* and armature *s* and common return *3*, operating contact *q* of relay by coil *p*. The points now move over, and when the movement is completed the contacts *u* and *u'* are broken and the valve current flows via make and break wheel *x*, wire *6*, relay contact *q*, switch box contacts *r*, spring *5* to return *3*, the point detector spring *5* having moved from contacts *r'* to contacts *r* while the points are moving.

A vibrating current is now set up in the primary *j* of transformer, inducing an alternating current in the secondary

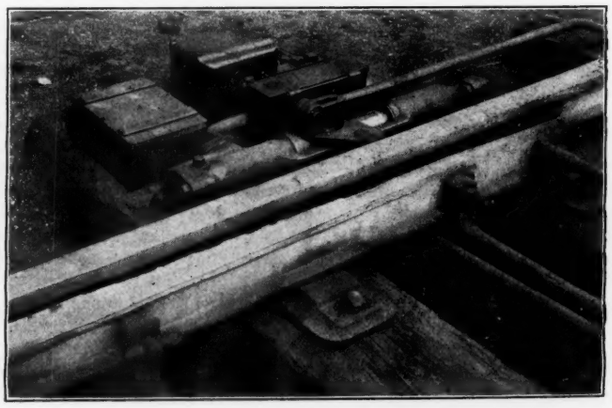


Fig. 2—A. H. Johnson's Electric Switch Movement.

j'; this current flows through wire 7 to brake coil *n*, lifting brake *h'* from the pan *m'* of centrifugal indication apparatus; then through induction motor *m*, wire *8*, contact *g*, spring *b*, contact *h*, back to secondary *j'* of transformer. The induction motor *m* now revolves, operating the centrifugal device, which lifts the lock from notch *x'* and allows the stroke of the lever

to be completed to position *l'''*. This breaks all the contacts attached to the lever and cuts off the power, de-energizing the relay coil *p* and causing the relay to assume its normal position with both contacts disconnected. To return the points to their normal position lever *l* is pushed to position *l'* and the current then flows via contact *k'*, spring *d*, contact *e*, relay coil *p'* and motor field *t'*, and the vibrating current flows via contact *q'*, *r'*, to wire *3*. When the indication latch is released from notch *z*, which occurs when the points have completely resumed their normal position, lever *l* can be returned to position shown in Fig. 3.

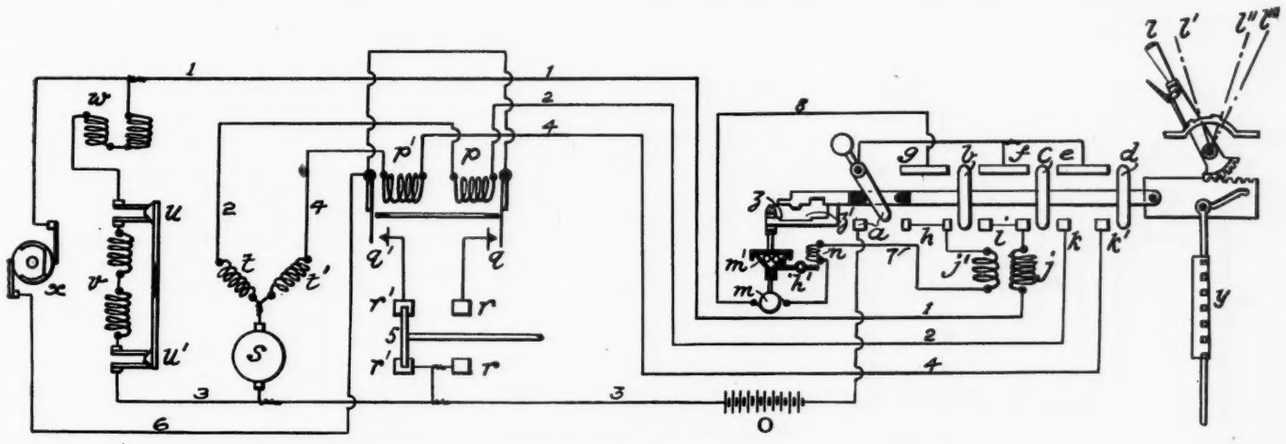


Fig. 3—Circuits for A. H. Johnson's Electric Interlocking.

The centrifugal device mentioned consists of a small motor, to the shaft of which is attached a pan which is divided internally into four compartments, in each of which a steel ball ¼ in. in diameter is placed; a lid which can be moved vertically is placed over the pan. When the motor revolves the balls run up the side of the pan, impelled by centrifugal force, and lift the lid and lock. The brake is provided so that should an accidental contact be made in any manner so as to induce a momentary current in the secondary of the transformer, the brake would not allow the motor to attain sufficient speed to lift the lock. The apparatus is of course immune to a continuous current as it is placed in the secondary circuit of the transformer.

The time required to operate a switch is 2½ seconds with a current of three amperes while working and 1.5 amps. when motor is running on the bye-pass.

There is an alternative design of the point movement, which is the same in principle, but a radial arm working in a quadrant-shaped chamber is used instead of the ram and ram chambers. This design of the movement takes up rather less space by the side of the rail.

Fig. 4—The Frame—Johnson Interlocking.

The signal movement shown in Fig. 5 is similar to the switch movement in principle but rather different in design. It consists of a cylinder and piston, a rotary gear worked by a $\frac{1}{20}$-h.p. motor, and an electro-magnetically controlled valve shunted across the motor mains. A pipe is led from the reservoir to the rotary gear and from there to the cylinder; there is also a duct leading from the cylinder to the reservoir, which is closed by the valve when working the signal. A snap switch is provided which cuts off the current from the motor when the arm has reached the proceed position but leaves the valve in circuit. The arm would then move very slowly towards the stop position, but on reaching a certain point the motor would be put in circuit again by the snap switch and the arm would be forced back to its original position. This movement of the arm would not be visible to an engineman, and is an effectual protection against the arm freezing in the proceed position.

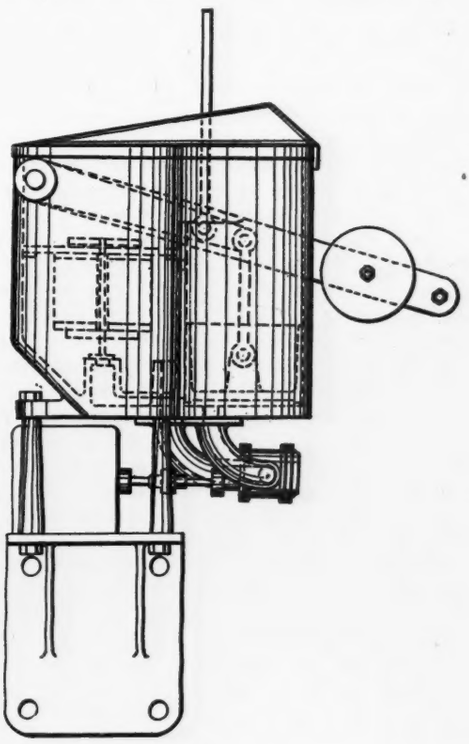


Fig. 5.

To operate a signal the lever is reversed, causing a current to flow through the valve magnet coils and the motor simultaneously. The piston is forced up by the action of the rotary gear and oil until the arm is at proceed, when the motor is

cut off, but the valve remains held. When the lever is put normal the valve is released, oil flows back from the cylinder to the reservoir, and the arm goes to stop by gravity. When the arm has returned to its normal position certain contacts are made, which release the indication and allow the lever stroke to be completed.

The signal circuits pass through the contacts operated by the switch levers, and should the points not correspond it would be impossible to clear the signal. After the route has been set up and the signals cleared, should anything happen to the points the signal circuits would be broken and the arm go to stop.

In connection with the switch circuit it will be noticed that a separate wire is used to control the valve, so that should a cross between a live wire and the motor mains occur the valve would not be held or the bolt unlocked, and the motor would simply revolve. A further safety device not shown in Fig. 3 is a means of grounding the operating wires when not in use.

There is no clutch in either the switch or signal apparatus, and all the coils or small parts are under oil and so protected from the atmosphere. The main castings themselves are strongly made and no cover is needed, with the exception of an iron plate over the switch movement ram. The apparatus can be applied by simply bolting down to the ties, and there is no necessity to cut these in any manner. A two-lever interlocking machine is shown in Fig. 4.

An installation of this system, but having a modified circuit scheme, is being made on the Metropolitan Railway between Aldgate, Broad street and Bishops Road, London, by the McKenzie, Holland & Westinghouse Power Signaling Company, who have acquired the patent rights.

NEW RAILROAD LAWS IN OHIO.

The last Legislature of Ohio passed 12 general laws affecting railroads. House bill No. 894 amends the general law so as to authorize railroads to collect an extra fare of 10 cents when a passenger pays fare on a train. The law provides that the ticket office must have been open at least 30 minutes. Senate bill No. 344 makes it unlawful for any person to drink intoxicating liquors on any engine or car, except a dining car or cafe car. Penalty $5 to $100.

House bill No. 673 makes railroads liable for damages to employees for injuries sustained by reason of a defect in any engine, car, track, works, etc., if such defect could have been discovered by reasonable care or inspection. An employee thus injured shall not be deemed to have assumed the risk, even though he continue in employment after knowing of the defect. The law also makes the company liable if the injury is caused by carelessness or negligence of a fellow employee, officer or agent. Section 2 of the same law provides that where an employee's contributory negligence is slight and that of the employer is greater in comparison, the jury shall decide what proportion of the contributory negligence is chargeable to the employee.

House bill 1,078 prescribes imprisonment for unlawfully removing any part of any locomotive, track, track fixture, bond wire, trolley wire, journal brass or other thing necessary in the operation of a railroad.

House bill 984 requires a bond of $5,000 to be given by corporations, firms and companies selling tickets to foreign countries and taking deposits of money to be sent to foreign countries.

Section 3,270 of the Revised Statutes, defining the powers of railroad companies, is amended so as to provide that a railroad company may not require an employee to waive his right for damages by reason of such employee joining a relief association or society. (House bill 787.)

House bill 922 amends Section 4 of the act of April 25, 1904 (Section 3,337-17m., R.S.O.), prescribing the way in which railroad and highway crossings may be constructed. The statute as originally written related only to the construction of a new railroad. As amended it provides for crossings in case of changing or altering the location of a railroad or in the diversion, change or alteration of any existing highway. The common pleas court still has authority to determine whether such crossing shall be at grade or otherwise. The law provides an appeal from the Court's decision to the Circuit Court, as in civil actions, the decision of which Court shall be final.

House bill No. 836 amends Section 3,324. This statute requires railroad companies to build fences, crossings and cattle guards, and the amended act allows the property holder, who is compelled to make a fence by reason of a railroad company's negligence, attorney's fees not exceeding $25, in addition to the cost thereof.

House bill 805 amends and supplements Sections 8, 14 and 31 of the Railroad Commission Act. Section 8 relates to free transportation and the amendment is the addition of the Interstate Commerce section relating to free transportation. The only effect of this statute is to designate additional persons to whom railroads may give free transportation. Section 14 is amended by conferring upon the Commission power to fix joint rates and apportion divisions. Section 31 is amended so as to give the Commission power to make awards for claims, charges or demands against a railroad company, loss of or damage to property and for overcharges upon shipments.

Senate bill 548 amends Section 2 (Sec. 247e, R.S.O.), by conferring upon the Commission power to secure protection where any two railroads, whether steam, interurban, electric or street, cross at grade, by requiring such companies to install safety devices. This statute heretofore did not include street railroads and gave the Commission no initiative, action being possible only when one of the railroads intersecting petitioned for the intervention of the Commission.

Senate bill No. 559 amends Sec. 3,283 by granting to municipalities the power to authorize railroad companies to place piers in public streets and grounds for the elevation of tracks.

Senate bill 469 amends Section 1 of the act of April 23, 1904 (Sec. 3,333-1, R.S.O.), relating to the duty of the Common Pleas Court to define the manner of railroads crossing each other outside corporate limits by providing that where it becomes necessary within the corporate limits of a city or village for the tracks of one railroad of whatsoever kind to cross the tracks of another other than within the limits of a public street or highway, the Court shall determine the mode of such crossing and apportion the expense of the same.

PICKED UP ON THE ROAD.

BY GULF.

It is a curious commentary on the non-thinking, that is to say the majority, of humanity, to note the willingness to believe an assertion that something unknown can be easily learned by a short cut method, a sort of mental get-rich-quick system of cram and choke. For example, a machinist who knows that it has taken years of constant work and close application to learn his trade, can be sold a book on electricity on the promise that it will make him an expert in a week; and yet he would laugh to scorn a machinist's manual for which a corresponding claim were made. This putting out of weak, superficial technical literature and the claims made for it has been a prolific cause of disappointment in our modern life. If writers would only limit their ambition and deal thoroughly with a detail rather than try to produce a comprehensive teach-it-all treatise, the ambitious workman would get more nearly what he needs, and the writer's reputation would be correspondingly enhanced. But, then, the royalties would be less, perhaps, and that is the usual object of making these books. So we may look for the procession of shallow books to move on.

THE PHYSICAL QUALITIES OF STEEL IN RELATION TO ITS MECHANICAL TREATMENT.*

BY JAMES E. YORK.

It is my purpose in the present paper to attempt to review the existing methods for the mechanical treatment of steel, and to suggest some changes which I believe will result in the production of more reliable steel rails and other similar sections than those now produced by ordinary methods.

In the United States during the year 1907 there has been continual controversy between the railroad officials and the steel manufacturers, the former asserting that the rail metal was not as good as formerly, and the latter that the cause for the frequent rail fracture is poor track construction and the much greater axle loads used. There cannot, however, be such a divergence of opinion without bringing some light into the subject and making for an improved quality of rail in the future.

It is conceded on all sides that the chemical composition is now under much better control than formerly, so that, even with the comparatively high percentage of phosphorus in use in America, it is certain that reliable steel can be produced if the mechanical treatment is on correct lines. In this connection I may quote Robert W. Hunt, who has been more closely connected with rail-making in its various departments than any other authority with whom I am acquainted. In 1904 Mr. Hunt read a paper on rail steel, in which he made the following statement: "I have repeatedly said that the mechanical treatment of the metal forming the steel rail during its manufacture is comparatively of much greater importance than its chemical composition, and years of observation confirm and emphasize this fact."

During the last 40 years almost all the improvements in the mechanical treatment of steel, especially of rails, have been in the direction of increased output. Whereas 40 years ago 150 tons per shift of 12 hours was considered good work for a mill, now 1,200 tons are expected in the same time. It is stated by some eminent metallurgists that this increased output is the chief cause of poor rails, the steel being "squirted" through the rolls, as they express it, so that a rail of 100 lbs. weight per yard is now produced in 15 to 20 passes, whereas formerly 30 or more were required to obtain a 60-lb. to 65-lb. rail.

Probably A. L. Holley, of distinguished memory, R. W. Hunt, John Fritz and the late Captain Jones have done more to add to this increase in modern rail production than any one else. Mr. Holley read before this institute in 1874 a paper, under the title of "American Rolling Mills," describing a rail-mill of about that date.

The blooming-mill was three-high, with rolls 30 in. in diameter, and it was run at from 45 to 50 revolutions per minute. On this mill a 14-in. square ingot was reduced to a 7-in. or 6½-in. billet in 16 to 18 passes in three and a half to four minutes, the ingots weighing about a ton, and they were intended to produce two 30-ft. rails of 65 lbs. to the yard. The top third of the ingot is sheared off so as to produce only sound rails, thus giving about 150 tons finished rails per day of 12 hours. The diameter of the rolls of the finishing-mills was from 21 in. to 24 in., and the number of revolutions 70 to 80 per minute. In these mills the billets were reduced into rails in from 13 to 15 passes, making the total number of passes about 30.

In England the practice was almost identical, excepting that in some cases the ingot was hammered to the proper-sized billet for the finishing-mill. Although this was more costly, it undoubtedly produced a billet with better physical qualities, provided that the heating had been carefully attended to. My own personal experience at that time entirely confirms these statements.

The rails referred to by Robert Job, metallurgist, in a paper read by him before the Railroad Club, as lasting in the track of the Philadelphia & Reading Railroad for 34 years, were made at John Brown & Co.'s works in Sheffield in 1864. These rails were most likely rolled from hammered billets.

It would appear that all steel makers, when striving for export trade, will produce, if possible, an article superior in all essential qualities to those for domestic use, and this is natural, as they want to extend their business. This seems to be confirmed by the fact that in English rail-making experience there is hardly any case of steel rails lasting over 25 years, whereas, according to Sir Lowthian Bell, iron rails in many cases last this time.

HEATING INGOTS.

The chemical composition of steel ingots may be all that can be desired, but if they are not properly heated the quality of the steel is seriously affected, and no subsequent treatment short of cooling and re-heating to the proper temperature can eliminate the defects. Burnt steel is not only more or less damaged for use, but makes very poor scrap.

In order to produce reliable steel it is absolutely essential that the heating should be carried out and controlled in the most careful manner. Although the importance of proper heating is generally understood, there is yet no branch of the steel industry which is left so much to the "rule-of-thumb" method as the heating of rail steel. The men who do this work have very little comprehension of the relation between the color of the ingot and its temperature, and, as is well known, at the same temperature steel looks much hotter at night than in the day. The successful heater is one who can guess the hottest temperature at which the steel will roll without cracking, as naturally the hotter the metal the softer it is, and hence the reduction is easier and more rapid. However, this method has two serious defects, as the first, overheating, destroys the best structure of the steel, and, in addition, the finishing temperature is so high that no proper fining of the grain is possible.

Recent investigations have conclusively shown the deteriorating effects of overheating, and that these can be only restored by cooling to normal temperature. There is no doubt that the care employed in heating crucible steel accounts for the excellent physical qualities usually found in steel of this grade. In the earliest stages of Bessemer steel manufacture the heating of rail ingots was governed largely by the practice in use for tool steel until the introduction of low-carbon steel to take the place of soft iron, and to which a high temperature can be given with more impunity than to higher carbon steels.

The usual method of heating steel rails was as follows: The ingots were laid in a horizontal position during heating, which allowed of the frequent examination and turning of the ingots so that they could get uniformly heated without much trouble. At the present time the pit is charged with ingots in a vertical position, which undoubtedly is more economical, but the steel is usually still fluid in the interior of the ingots when they are introduced. In this connection the instructions for heat treatment in rail specifications are rather vague, "that ingots are not to be drawn until the steel in the interior becomes solid, and are not to be heated enough to make the cinder run." There is nothing in the instructions to guard against overheating the steel, nor do they indicate what degree of heat is intended.

As a conclusion, I would draw attention to the following principles:

1. That the finishing temperature should be as low as is possible to get best results, and that the initial must not be above another limit, about 950 deg. C.

2. That if under these conditions the ingot cannot be rolled to four-rail lengths in one operation, the initial size should be reduced.

SOLIDITY OF STEEL INGOTS.

The iron and steel business owes more to the rolling-mill

*From a paper read before the Iron and Steel Institute, London.

for its development than to any other element connected with it. I am inclined to believe that the inventor of grooved rolls, Henry Cort, never saw any other sections rolled than rounds, flats, squares and plates, and for the production of these shapes no better machine exists than the ordinary rolling-mill. However, the evolution of railroads and other large users of steel having demanded the production of more complicated sections, the rolling of which is attended by some difficulty when steel of the best physical quality is demanded, some of these difficulties will now be considered.

First, the lack of penetrative action in rolling. It is well known that in the reduction of a large or even medium-sized ingot there is very little fining of the grain until the thickness has been very much reduced, and the temperature is near the bottom limit. This is particularly noticeable in the rolling of ingots into billets and slabs.

Steel ingots, even when produced with the greatest care, suffer to a great extent from three defects—pipes, segregation and blowholes. The last is the cause of No. 2 rails generally. In consequence of these defects and the inherent weakness of the steel at this juncture, the ingot should be reduced slowly at first, with the large end presented to roll. This method will facilitate the raising of the segregate, otherwise cracks develop, which are liable to remain unclosed, especially if there is any oxidation.

In consequence of the small penetrative action, there is no closing of the pipe, which is merely stretched proportionately with the billet. As a result there is an inherent and hidden weakness in a more or less large proportion of the billet, which if subsequently used for rails can only yield a low quality product. As you will know, such defects in rails are one of the principal causes of rail fracture, with all the danger attendant on this. Professor Howe and many other leading metallurgists and chemists have given much thought as to how pipes and segregated matter can best be eliminated from

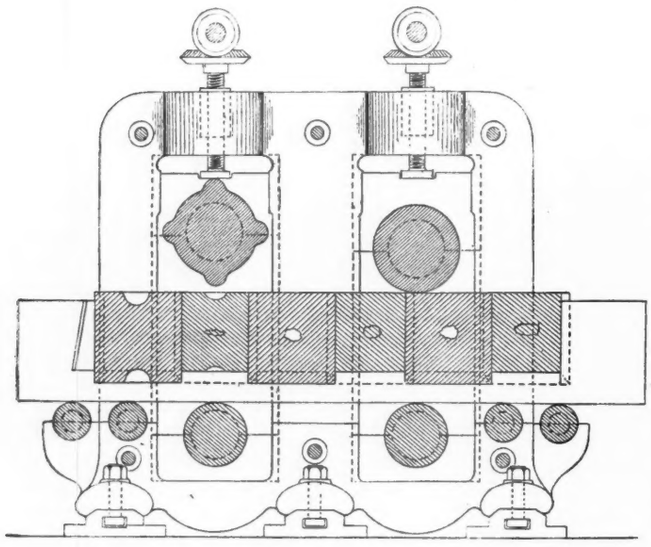


Fig. 1.

ingots. The general consensus of opinion among experts is that it cannot be done by chemical means, but must be done by mechanical if at all. At present the method is to chop off from the end of the billet a certain proportion, which is supposed to be sufficient to leave the remainder homogeneous, but this way is unreliable.

As I have stated above, ordinary mills stretch the metal by rolling, and therefore lengthen both the pipe and ingot simultaneously. Under these conditions it is impossible to close the pipe in the blooming-mill. It has been suggested that by rolling the ingot more slowly the pipe might be closed and possibly welded. This, however, is a mistaken idea, as the only result of slow rolling is that you can increase the work on the section up to the frictional limit, increasing the reduction per pass, but it is impossible to do more.

Several mechanical methods for compressing ingots have been tried, and are more or less successful as machines. However, they all possess the drawback of being slow in operation, and hence have not been seriously applied to rail manufacture, as they would greatly interfere with the output and increase the cost. It is absolutely essential that the ingot should be comparatively free from pipes and blowholes before

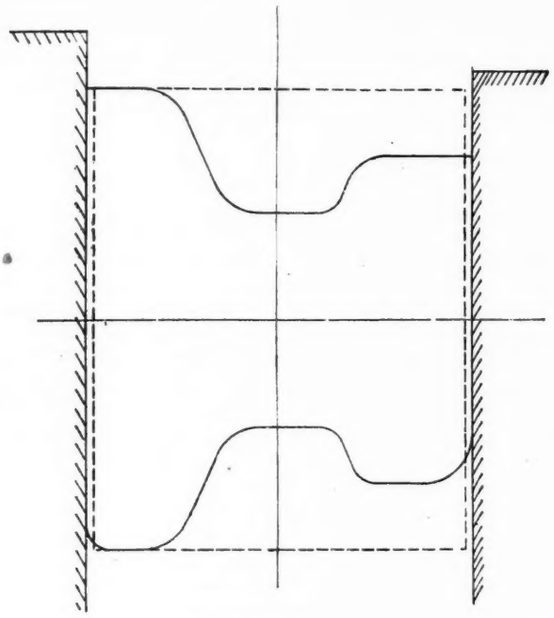


Fig. 2.

the operation of rolling commences in the blooming-mill, otherwise there cannot be produced a billet of proper structure from the top of the ingot, and consequently the rail with the necessary physical qualities cannot be produced unless the ingot is solidified before it is bloomed, or the necessary top portion sheared off after.

SOLIDIFYING INGOTS BY TRANSVERSE ROLLING.

The necessity for some cheap, quick and efficient method for solidifying ingots induced me to apply my method of transverse rolling to this problem. The mill, with slight changes, in which this is carried out was described in a paper read at the joint meeting of the American Institute of Mining Engineers and the Iron & Steel Institute in London in 1906, to which reference may be made for details and other applications. Fig. 1 shows an end elevation of the mill with six ingots in place for treatment. The ingots are arranged alternately reversed so as to save room, and the number of ingots may be increased or diminished as is found desirable or the dimensions of the mill allow. The ingots lie on a comparatively level horizontal table, and are first operated on by the plain roll No. 2, which closes any surface blowholes. The ribbed roll No. 1 is so constructed that the distance between the ribs corresponds to the distance between the centers of ingots and the corresponding rib on the base; the ribs are preferably made removable so that they can be provided of the right length and contour to suit any particular series of ingots, but in all cases the rib must be longer than the pipe to be eliminated. The operation of rolling involves the use of comparatively little power, since the metal is merely shifted inwards along the line of the pipe. It will usually be sufficient, owing to the taper of the ingot, to have ribs of the same depth throughout, and in consequence the rib will make

contact first at the bottom of the pipe, and will gradually squeeze out any segregated material. However, if desired, the ridge may be tapered, or the plain roll may have a collar at any particular point for the purpose.

With this method the ingot will be left with two grooves of semi-circular section which, however, will not interfere with the subsequent rolling. To avoid this, if desired, the ingot may be cast with ridges, which when forced in will leave the surface comparatively plain.

The mechanism is so arranged that the ingots are brought automatically into the correct position, and the rolls are vertically adjustable so that the bed may receive its full stroke immediately.

RAIL FINISHING-MILL.

As I have mentioned above, the work done by the rolls working with their faces parallel in the manufacture of blooms, plates and flats is satisfactory. It is only when rails and other flange sections have to be produced that the more elaborate rolls required do not give the same satisfactory results. Fig. 2 shows the general form of the first shaping pass from a billet to a rail, varying with the dimensions required in the finished rail. It is clear that the metal in the web and head is the only part of the billet which receives any material reduction, and as the flanges and head are gradually formed, less and less true rolling action is performed upon them. The action which can take place in these parts, where the roll surface is at right angles to the rail, can only be largely of the nature of wedging or drawing. The result of this must be a condition of unequal stress in the flanges. Another serious defect in the use of these rolls for flange sections is the great difference of surface speed at different parts of the section, the diameter of the roll forming the wedge being frequently 5 in. larger than a portion in contact with the extremity of the flange, and sometimes more. As a consequence the web is delivered from the roll much faster than the flange, where the metal must either slip or stretch to compensate for this (see Fig. 3). This is the principal reason why, when the flange breaks, the fracture is almost always crescent-shaped, as described by J. P. Snow in the

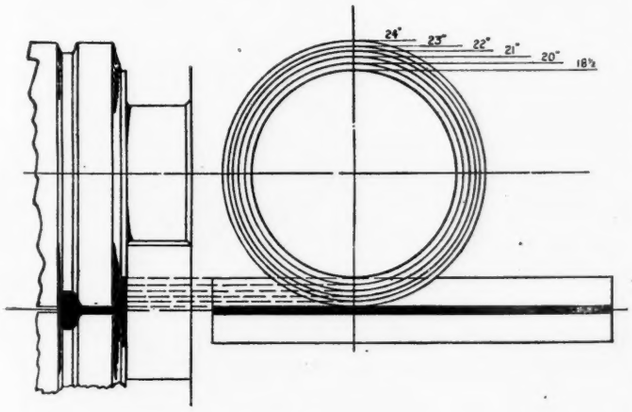


Fig. 3.

Iron Age, Jan. 23, 1908, and by many others. The head of the rail is formed in a similar manner but of less degree, and does not suffer to the same extent, as, having a large mass and hence cooling more slowly, it can stretch and accommodate itself more easily. However, the higher temperature at which it is finished makes the head always softer than the flange or web, the reverse of what is necessary in a serviceable rail. The T or Vignoles rail, which is to be commended on account of its adaptability to quicker and cheaper construction in railroad tracks, will always suffer to some extent from this defect with the usual method of rolling.

In the case of the bull or double-headed rail used generally in England, the quality will in general be better in consequence of the similarity in width of the head and base, which permit of them being finished at approximately the same surface speed and about the same temperature. These rails require more uniform sleepers, heavy chairs and apparently cost per mile for maintenance. As I believe the axle loads in England do not exceed 60 per cent. of those in use on the first class lines in the United States, the proportion of rail fractures is comparatively small. However, out of the total number of 284 rail fractures in the United Kingdom in 1906, 66 were T rails, which do not exceed 5 per cent. of the total rails in use. This confirms my statement as to the defects in these rails.

The T rails referred to by Mr. Job as having given such excellent results in service (35 years), were narrow flange rails and were much more expensive, costing quite three or four times the present price. Both these facts must be taken into account in considering their quality.

The designing of rolls for producing steel sections of all sorts, and especially T sections such as rails, requires very considerable experience, and has an exceedingly important bearing on the result obtained. Too generally the principles employed in the reduction of steel have been influenced by the possibilities in iron rolling, although the conditions were largely different. The high initial temperature permissible in iron permitted greater reduction per pass up to the frictional limit, and also a greater amount of guessing as to the possible reduction. Usually the first passes were intensified by scarring or roughening the roll face without damage to the resulting finished section; but this procedure cannot be used successfully with steel sections.

At various times during many years I have noticed that there was no systematic reduction in the passes as designed, and that sometimes the roller was in the habit of even skipping a pass. It therefore seemed to me that it was desirable to work out a method for the systematic reduction of metal, and I instituted experiments to discover the possible reduction in various sized rolls. From the data obtained I was able to work out a method of fractional reduction which enabled me to know whether it was possible to produce a steel section in a given number of passes. In this way it was possible to avoid with certainty any chance of roll fracture or of choking.

By applying this system I find that the remarkably good quality exhibited in rails made 40 years ago was obtained by rolling at a low initial temperature. Taking a 14-in. ingot, the size used in this case, and a factor of 0.9, the lowest factor ever used in my practice for steel of that hardness, I found that it required 32 passes to obtain a 65-lb. rail. It is not to be supposed for a moment that the most skilful steel manufacturers in the world at that time were working these at a lower capacity for amusement, and if similar good qualities are required to-day it is necessary to work under relative heating conditions. I am informed that at the present time a 22-in. square ingot weighing two tons can be rolled into four-rail lengths in 15 to 20 passes, and it is clear that a considerably higher initial temperature must be employed, with the result that there is less effective work on the material, and that the resulting quality is inferior.

Steel rolling, with the conditions of greater hardness and lower temperature, requires a harder and stronger roll than was the case with iron. However, the only class of roll which keeps its shape under the condition of work now required is the hard chilled roll, which cannot be adapted for deeply-grooved rolls, as now used in rolling rails at the finishing passes.

In my paper above referred to I also described my universal mill, which can give the finishing passes at the lowest possible temperature and with the hardest surface to the rolls. Owing to the special construction of this mill, beams of small depth with a 12-in. flange can be delivered perfectly straight

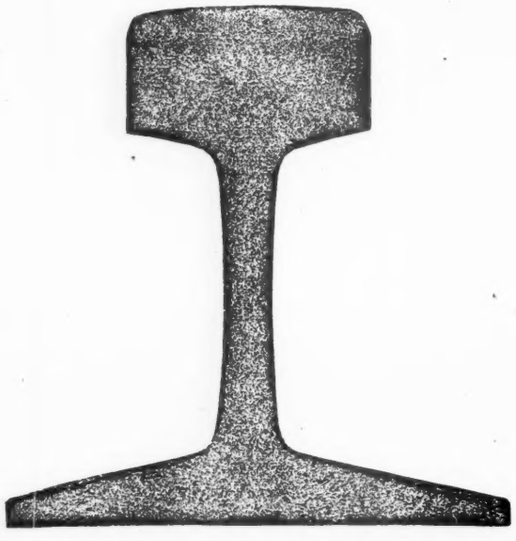
from the roll. Also, owing to the presence of the side roll, rails can be produced without the internal strains mentioned above, and, in consequence of the possibility of doing more work there, with a better wearing quality metal in the head.

The high speed given to rolls in modern rail-mills is repeatedly referred to as one of the chief causes of inferior rails. This is in a large degree a mistaken idea. If the metal being rolled is comparatively solid and has not been overheated and the rolling action is on proper lines, there will be no damage to quality other than incidental to the shape of pass (Fig. 3); as before described, the speed of delivery of a modern rail-mill is about 650 ft. per minute. The York universal mill is now rolling beams at a speed of about 1,600 ft. per minute without deteriorating the physical qualities of the finished product. This is made possible by side-rolling action, which dispenses with the different speed delivery referred to in the ordinary mill, also the wedging and drawing action now inherent to the ordinary process when rolling rails and other flange sections.

EXAMINATION OF 100-LB. RAILS.

BY G. B. WATERHOUSE, PH.D.

The strength, composition, and structure of the material in different parts of a rail have always been somewhat unsettled points. The tests, of which the results are given below, were



Etched Section of 100-lb. Rail.

made on a first quality 100-lb. A. S. C. E. rail was taken from stock. The steel was made by the acid Bessemer process and the ingots rolled without reheating. From this rail, two adjacent pieces, 8¾ in. long, were cut with a slow speed cold saw, and from these pieces tensile test bars were machined of the dimensions and in the positions shown in the drawing.

The results of the tensile tests are given in the following table, the figures being the average of those obtained from the duplicate pieces:

TABLE 1.—*Tensile Tests.*

	Elastic limit.	Ultimate stress.	Elongation in 2 in.	Reduction of area.
No. 1.	52,200 lbs.	108,400 lbs.	16.75 per cent.	29.9 per cent.
" 2.	52,200 "	109,850 "	16.25 "	28.4 "
" 3.	54,460 "	110,750 "	18.50 "	33.2 "
" 4.	55,000 "	110,150 "	18.50 "	28.6 "
" 5.	53,100 "	110,300 "	18.25 "	29.4 "
" 6.	53,820 "	110,400 "	18.00 "	31.0 "
" 7.	51,740 "	109,850 "	18.25 "	35.4 "
" 8.	53,340 "	111,300 "	17.00 "	36.4 "

Drillings, taken from the ends of the test pieces, gave the following analysis results. As before, the figures have been averaged:

TABLE 2.—*Analysis.*

	Carbon.	Silicon.	Manganese.	Sulphur.	Phosphorus.	Copper.
No. 1.	0.52	0.140	0.77	0.074	0.089	.....
" 2.	.51	.145	.77	.076	.089	.....
" 3.	.52	.152	.77	.079	.090	.....
" 4.	.52	.144	.77	.078	.090	0.185
" 5.	.52	.150	.78	.077	.090	Average.
" 6.	.50	.146	.76	.080	.089	.....
" 7.	.53	.153	.77	.080	.090	.....
" 8.	.52	.147	.77	.080	.090	.....

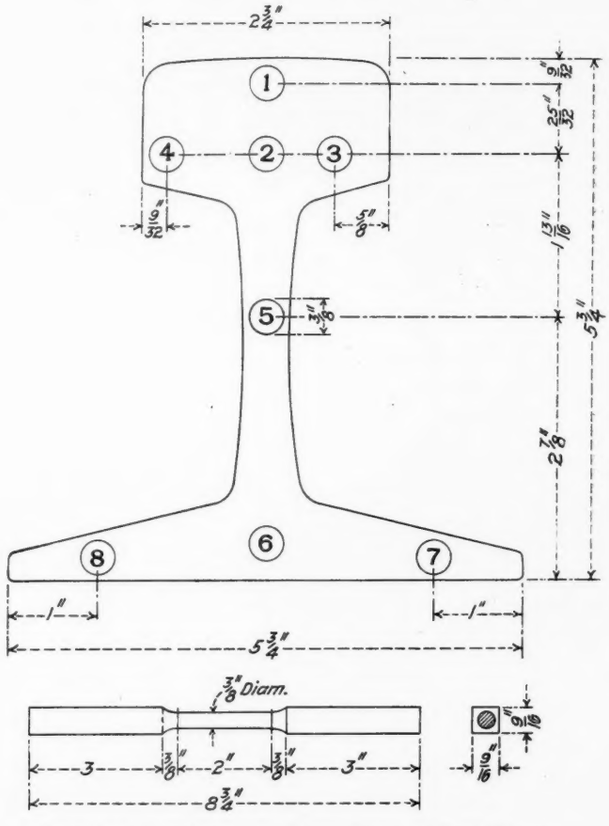
Pieces were also cut from the ends of the test pieces and prepared for microscopic examination. Photographs were taken at a magnification of 70 diameters, as near the center of the positions shown in the sketch as possible.

The average composition of the rail is as follows:

Carbon	0.51	Sulphur	0.078
Silicon	0.147	Phosphorus	0.089
Manganese	0.77	Copper	0.185

The analyses of material taken from the different portions of the rail show that the steel is quite uniform, none of the figures departing greatly from the average.

The physical tests also show the steel to be uniform in its mechanical properties, particularly in regard to ultimate

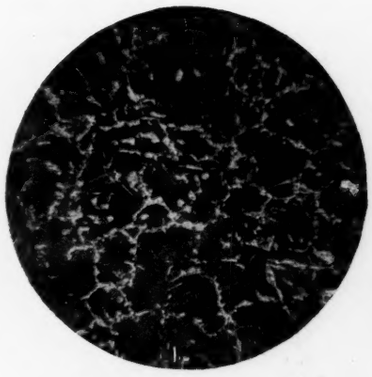


Location, Numbers and Dimensions of Test Pieces.

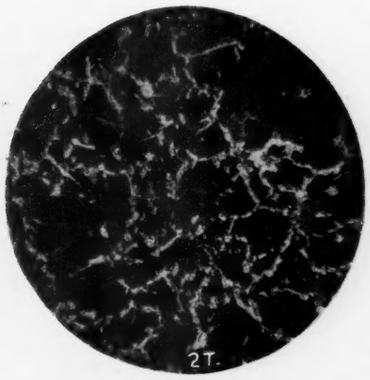
stress. The elastic limit was taken by observing the drop of the beam, and the other measurements obtained in the usual way. The effect of the greater amount of work on the web and flanges is not pronounced, the only notable difference being in the reduction of area.

The microphotographs of Nos. 1 to 6 indicate that the finishing temperature was also of considerable uniformity, for the transverse sections are very similar in pattern and in size of crystals. The much lower temperature of the flanges is well illustrated by the photographs of Nos. 7 and 8.

The correlated evidence of the chemical, mechanical and microscopical results is that the steel is of very good and even quality. This opinion is also supported by the accompanying photograph of a polished section of the rail, etched in hydrochloric acid, 1 to 1, for 20 hours.

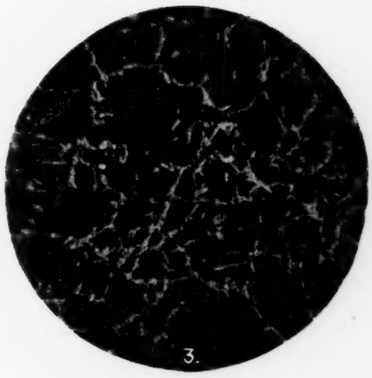


No. 1—Transverse.



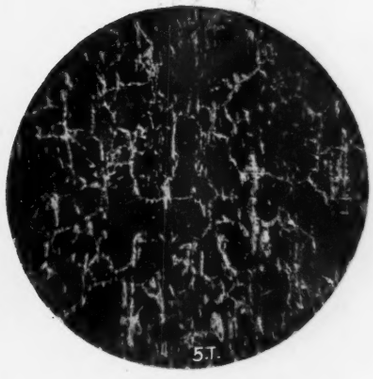
No. 2—Transverse.

No. 2—Longitudinal.

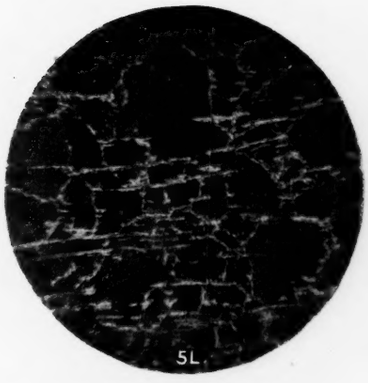


No. 3—Transverse.

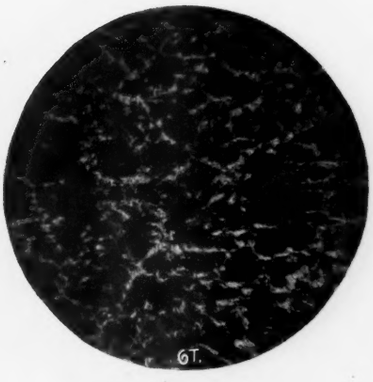
No. 4—Transverse.



No. 5—Transverse.



No. 5—Longitudinal.



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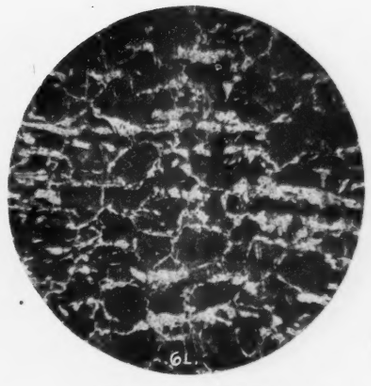

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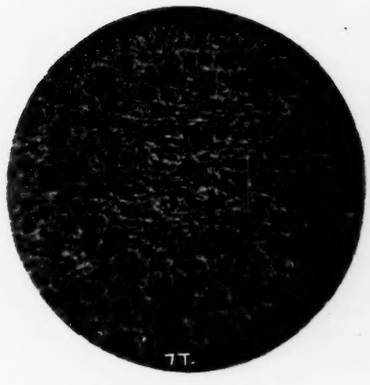
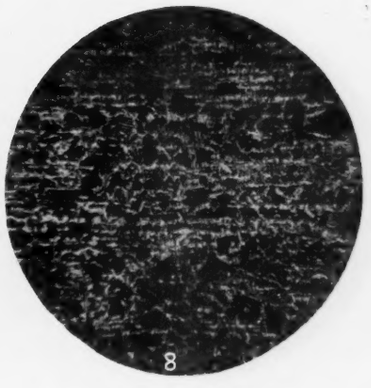


No. 7—Transverse.

No 7—Longitudinal.



No. 8—Longitudinal.

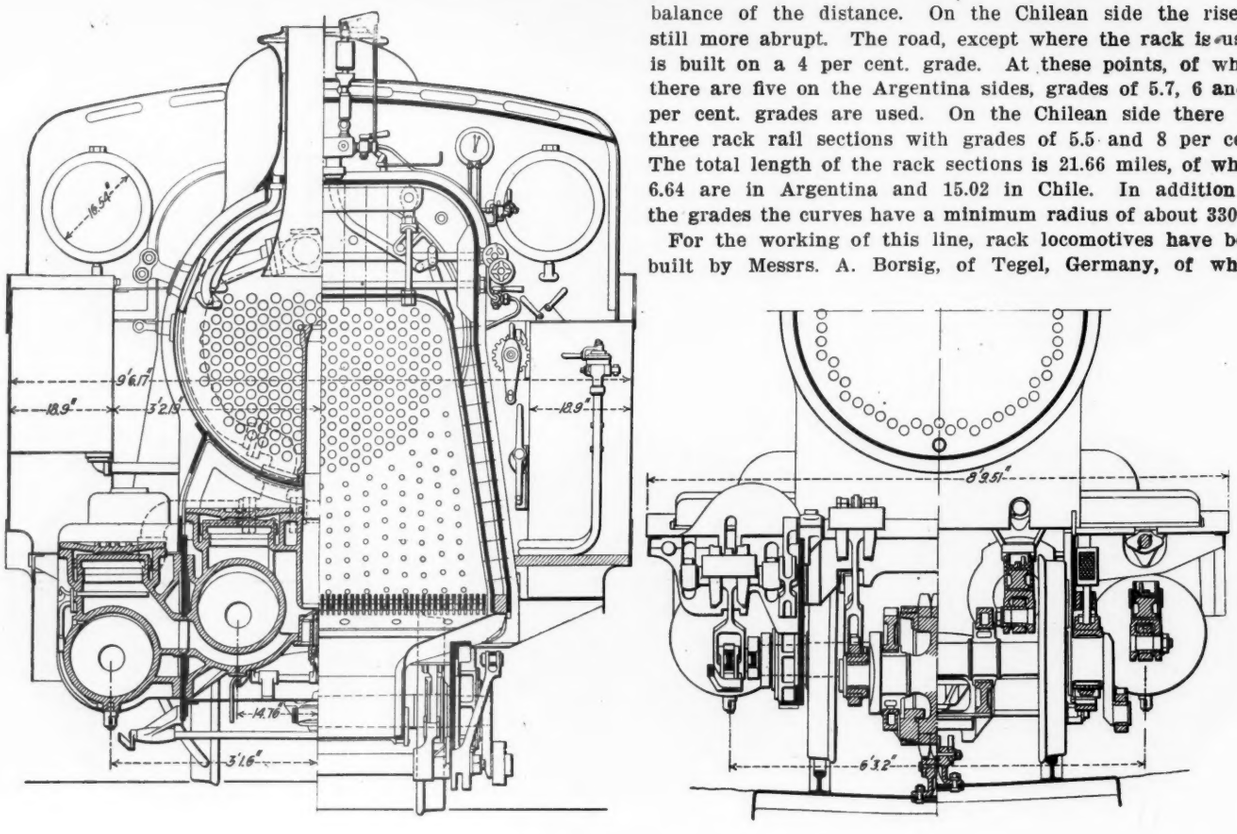
70 Diameter Microphotographs of 100 Pound Rail Test Pieces.

AN ABT RACK LOCOMOTIVE FOR THE TRANSANDINE RAILROAD.

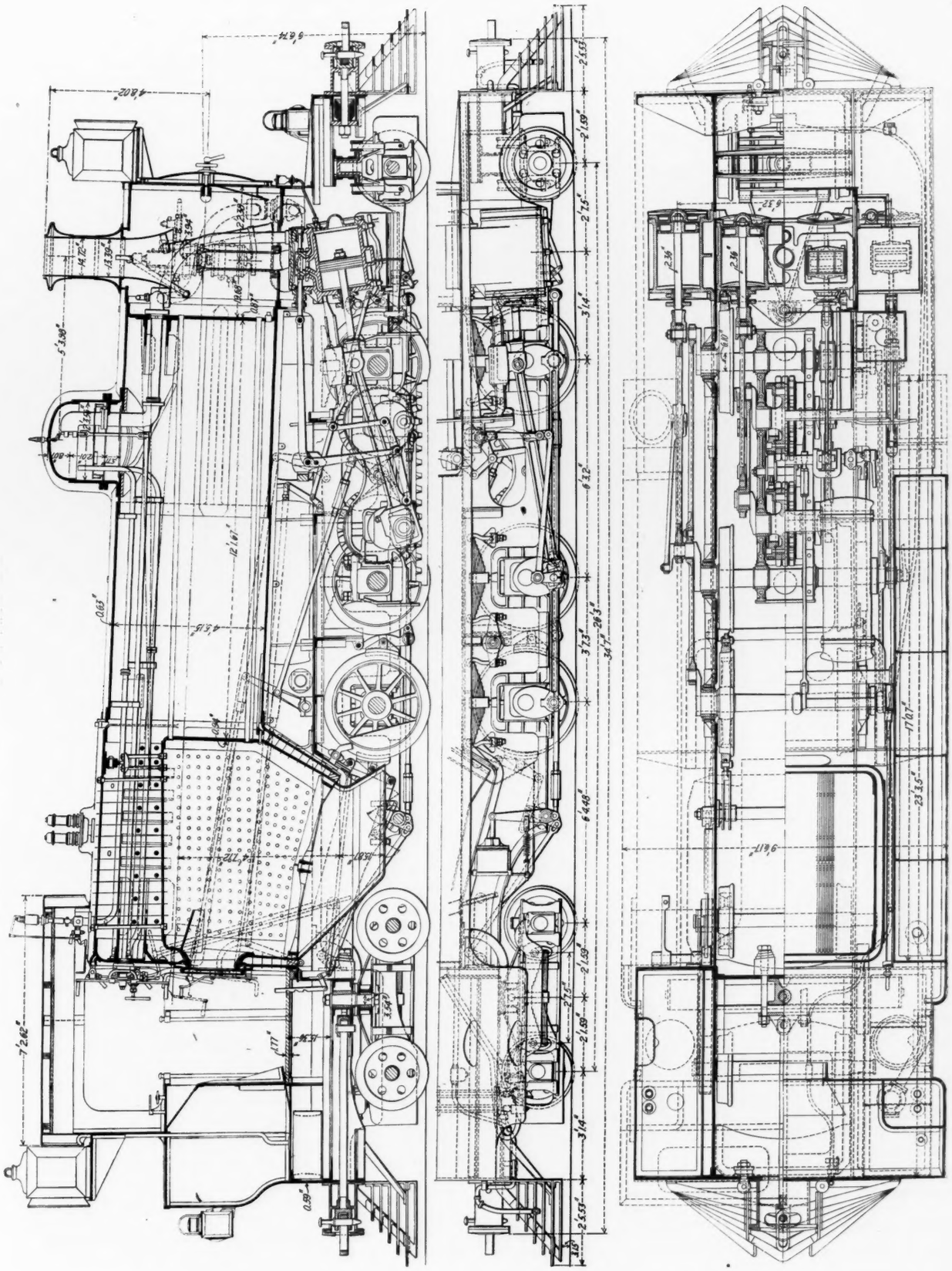
For many years there has been an effort to connect the railroad systems of Argentina with those of Chile by means of the Transandine Railroad. As long ago as the later nineties the work of grading and track laying had been completed to the foot of the slopes of the mountains on either side, but the gap between had to be passed on mules. In the issue of Oct. 11, 1901, the *Railroad Gazette* published an account of the road in its condition at that time. The particular portion of the route that is known as the Transandine section extends from Mendoza, in Argentina, to Santa Rosa, in Chile, a distance of about 150 miles. In this passage the road rises from a height of 2,350 ft. at Mendoza to 10,500 ft. at the summit, where there is a tunnel beneath La Cumbre, which rises above to a height of 12,800 ft., and this in a distance of 108 miles. The grade is nearly uniform for the first 90 miles to Punta de las Vacas, where a height of 7,650 ft. is reached. Here the grade becomes steeper for the balance of the distance. On the Chilean side the rise is still more abrupt. The road, except where the rack is used, is built on a 4 per cent. grade. At these points, of which there are five on the Argentina sides, grades of 5.7, 6 and 8 per cent. grades are used. On the Chilean side there are three rack rail sections with grades of 5.5 and 8 per cent. The total length of the rack sections is 21.66 miles, of which 6.64 are in Argentina and 15.02 in Chile. In addition to the grades the curves have a minimum radius of about 330 ft.

For the working of this line, rack locomotives have been built by Messrs. A. Borsig, of Tegel, Germany, of which

Rack Locomotive; Transandine Railway.



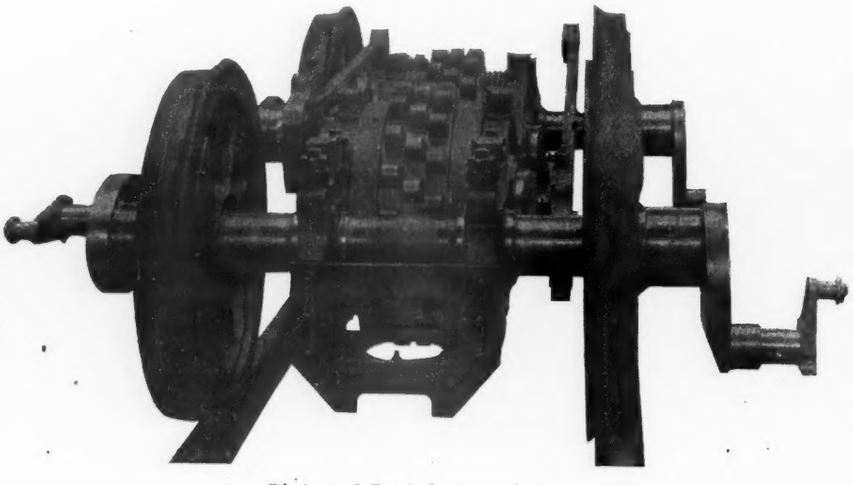
Cross Sections of Rack Locomotive.



Rack Locomotive; Transandine Railway.

half-tone reproductions of photographs and general drawing are here presented. The earlier engine of the two was of the 2-6-2 type, and this has been followed by the second, or 2-6-4, of which the detail drawings are given. The weight of the engine of the 2-6-2 type is 48 tons in working order, and it is fitted with four cylinders, two outside for driving the adhesion wheels, and two inside for the rack wheels. The diameters are 15¼ in. for them all, with strokes of 19¾ in. and 17¾ in., respectively, for the outside and inside. The 2-6-4 engines are heavier and weigh 125,400 lbs. in working order. These engines are intended to haul trains weighing 110 tons behind the engine up grades of 8 per cent. at a speed of 6 miles per hour, and up grades of 2.5 per cent. at a speed of 18 miles per hour.

The rack rail is of the Abt three-bar type, and the gear for working in it is carried on a cast-steel frame with bearings on the first and second coupled axles in a manner that is clearly shown in the reproduction of the photograph, where the connecting rods for the inside cylinders are shown in position. The three sets of pinions for the drive are between the frames, and the crank pin is brought up close to the crank, while the rods spread outward to the crosshead in a manner that has been used before on some engine of European design, by which the thrust of the piston rod



Pinion of Rack Locomotive.

is not carried back to the pin in a direct line, thus putting a bending stress on the rod that has not been usually considered advisable. The valves of the inside cylinders are operated by a modification of the Joy gear, and they are themselves of the ordinary D type. The modification consists of connecting an auxiliary rod to the stub end of the connecting rod and carrying the other end by a swinging hanger, thus somewhat lessening the amount of lift of the connection in comparison with what would be given it were it to be attached directly to the body of the connecting rod. The same general arrangement is also used for the outside cylinders.

In addition to the regular air brakes applied by means of shoes to the tires of the adhesion wheels, there is a strap brake applied to the drums on the pinion shafts. These strap brakes work in V's in the drum, are tightened by the usual method, are all connected to the same shaft, and are operated at the same time. The method of making this connection is clearly shown in the longitudinal section of the locomotive, while the general appearance and shape of the V's are shown in the view of the gearing and its frame.

The pony truck at the front of the engine is of the type that is in use under the mogul and consolidation locomotives of the United States, with some minor modifications of details. One of these modifications is the abandonment of the equalizing lever between the truck and the first pair of driving wheels. The truck carries its own load through the intervention of helical springs, and is of the swing link type. The links are double pivoted at the upper end, so that whichever way the frame may swing from the center it is raised, and thus has a tendency to return to that position. In the suspension of the engine there is an equalization between the two rear pairs of drivers, but the spring hangers of the front pair take hold directly of the frames, thus making them lose the flexibility that characterizes the American locomotives by adding this extra point of support on the sides.

The rear truck is of the ordinary four-wheel type, with equalizers between the wheels and semi-elliptic springs attached to the same for carrying the load. The lateral movement is controlled by long helical springs that extend from the side frames to a point near the center line and are enclosed in a casing to prevent buckling. In other respects the truck very closely resembles American practice.

The draft gear is of the once familiar link-and-pin type, and has the odd appearance of an old fashion. It differs from that in use in the United States, however, in that there is no provision for a spring resistance to buffing. The buffing stresses are taken direct by the front and back buffer beams without the intervention of any resisting medium; while the drawbar pull is taken by spiral plate or volute springs that have bearings against the front buffer beam and the bolster of the tender above the rear truck center. It will also be noticed that there is considerable lateral motion allowed to the rear drawbar in addition to that permitted by the link coupling itself. The safety chain eyes are carried by rubber washers, so that any jerk that may be transmitted through them is softened slightly before reaching the bumper beams.

The boiler is of the Belpaire type, and is set at an inclination of 1 in 25, so that the water surface will be parallel with the center line when the engine is on a 4 per cent. grade. Lines are shown in the longitudinal section indicating the position of the water when standing on an upgrade of 8 per cent. and a down of 2.5 per cent. The boiler is built for a maximum pressure of 213 lbs., but when the engine is working with the adhesion wheel only the pressure is allowed to drop to 145 lbs., while, when using the rack the steam is wiredrawn for the outside cylinders to the lower pressure. This is done by the use of two throttles, and the one admitting steam to the outside cylinders has a small opening, so that the desired reduction is accomplished. The throttle valves are of the slide form and work on vertical surfaces. The dome is provided with a perforated screen, so as to effect some separation of the steam from the entrained water and thus secure a greater dryness.

In accordance with the practice abroad there is no netting in the smokebox and the draft is adjusted by the projection of the liner of the stack down into the front end. The space between this liner and the barrel of the stack is used for the escape of the compressed air and steam from the Riggenbach brake, the cap of the stack being perforated for the purpose.

Plate frames are used and the axle boxes are carried in the manner common in European practice.

Whether these engines were specified by the purchasers or were designed for the service by the builders, they show a mixture of the influence of both European and American practice. We have taken the Belpaire boiler from abroad,

and in this the boiler in this engine resembles work here and abroad. The valve gearing has no place in America, nor has the slide throttle and the smokebox without a netting, but the pilot, the trucks, both the four and two-wheeled, are patterned after models with which we are all familiar. The combination of the Westinghouse, Rigenbach and the strap brakes are necessities of the service in which these engines are to run. The cab is patterned after European models, while the pilot and the headlight are distinctively American.

The following are some of the principal dimensions of these engines:

Cylinders (diam.)	15¼ in.
Piston stroke (outside adhesion)	19¾ "
" " (inside rack)	17¾ "
Diameter of driving wheels	35.43 "
" " truck wheels	27.09 "
" " rack pinions	23.62 "
Steam pressure	213 lbs.
Heating surface	1,345 sq. ft.
Grate area	28.19 " "
Tank capacity	1,728 gals.
Cooling water for cylinders	132 "
Coal	3 tons
Weight empty	91,190 lbs.
" in working order	125,400 "
Tractive effort of adhesion cylinders	15,978 "
" " " rack cylinders	31,642 "

MR. ARNOLD'S REPORT ON THE SUBWAY SIGNALS.

II.

There are a number of ways independent of the block system of reducing the actual time taken by a train at the station platform. There are a number of changes, however, in the block system itself which should be made as soon as practicable, which will add considerably to both the safety and the capacity of the subway. These changes should accomplish the following results:

A. Trains should approach the stations under *automatic speed control* supplemental to the present block system, and should be allowed to come nearer the station platforms than at present before being actually stopped, and this should all be done without encroaching on the factor of safety of 50 per cent. over and above the distance actually required in which to stop the train by means of the block system between stations.

B. The entering train should be allowed to come to the station platform as soon as safely practicable after the leaving train has started, and thus reduce the headway or the time interval between trains to the minimum time that can be maintained with safety.

The plans for changing the block system at the express stations which have been submitted to your Honorable Commission by the subway officials contemplate either leaving the automatic stop which now protects the station platform where it is at present or moving it even nearer the station. Neither plan provides the full measure of safety necessary to protect a train standing at a station in case the motorman fails to act. Final changes in the present system should move the automatic stop farther away from the platform rather than closer to it. This automatic stop was originally placed by the designers of the block system at a suitable distance to secure absolute safety, but as previously stated it was found that in this location the movement of trains and therefore the car capacity of the subway was seriously handicapped on account of the greater length of time taken by the trains in passing through the station block. The automatic stop was therefore moved *closer* to the station by modifying the overlap, and the responsibility for safety transferred to the motorman. Considering the state of the art of signaling at the time the system was installed and also the fact that the trains have all been handled without accident at these points, it cannot be said that this change in the block system has proven to be a serious mistake. I believe, however, that it is practicable to develop an improvement which will supplement the present system by which the present headway can be maintained and probably bettered, and at the same time maintain absolute safety without being dependent on the motorman for it. To do this the improved system must possess the following features in order to comply with the fundamental principles previously stated in paragraphs A and B:

1. The system must provide the same degree of safety in station blocks by means of automatic stops as is now secured by the block system on the tracks between stations.

2. When a train occupies a station platform and another train is approaching, the signals leading up to the station should indicate stop and the following train should be allowed to proceed with caution only when its speed has been reduced to a predetermined safe speed limit.

3. The speed control signal placed farthest from the platform should be at such a distance that if it indicates stop and a train passes it at excessive speed, the train will be brought to a stop and still have the usual 50 per cent. clearance between it and the preceding train. This requirement will necessitate placing the signal in practically the same position as originally installed.

4. These special speed control signals should be placed so that a train pulling up to a station will be allowed to follow the preceding train which is leaving the station as closely as may be done with the same measure of protection which is provided by the block system between stations.

The subject of the proper design of express stations will be discussed in another report, but it is proper to say here that had the express stations been constructed so that trains could have been alternated first on one side of the platforms and then on the other, the capacity of the subway could have been increased at least 50 per cent. with the block system as originally installed; but as this was not done it seems necessary under present conditions to refine the present block system to the greatest extent practicably consistent with safety in order to secure capacity.

I believe that there will be no great difficulty in getting proposals and guarantees of successful operation covering such an auxiliary signal system as is here proposed, and I recommend that steps be at once taken to develop and install such a system.

As it will probably take some time to install the complete protection hereinbefore recommended, I suggest a change in the present block system which can be made at once, and which will provide a means of reducing the cumulative effects upon the schedule of an occasional prolonged station delay. This change should enable the two minute headway on the express tracks to be maintained during the entire rush hour period. The delay in the train movement does not become serious until a train has been brought to a stop at the entrance to a station block. The excessive time required to get this train under motion and the corresponding low average speed at which it approaches and travels the length of the platform are handicaps which are almost impossible to oversome by reducing the time required for unloading and loading, particularly with the present type of car.

Now if the signal to proceed can be given to this delayed train a few seconds from the time the train at the station platform begins to leave rather than to have this proceed signal given when the last car leaves the platform as at present, it is possible to reduce the delay of the following train at least 17 seconds. If, therefore, such a permissive signal could be given to the first train which encounters a delay amounting to a stop outside of an express station, the cumulative effects of an excessive station wait could at once be counteracted; all the following trains could come into the station on time and the usual congestion of trains between stations could be avoided.

Such a system should have the following characteristics:

1. Means should be provided whereby the stopped train could give a visual and audible signal, to a special platform station attendant, that the entering train has been delayed to

the extent of a full stop. A device which can be reached by the motorman without leaving his cab and which will operate an electric repeating visual and audible signal will answer this purpose. The signal should cease when the motorman gets the proceed signal from the platform attendant.

2. A manually operated switch fitted with a removable handle should be put in a booth placed, preferably, at the leaving end of the station platform. The platform attendant should be able to release the emergency stop holding the entering train and give the proceed signal by this switch only after the oncoming train had come to a complete stop and the leaving train had begun to move. In case the leaving train should slow down or stop for any reason, the opening of another switch by the platform attendant would at once set the emergency stop in its original position under the incoming train and bring it quickly to a standstill.

3. An auxiliary automatic track stop and signal should be installed at the rear of the platform to be released or cleared only when the leaving train has entirely cleared the platform in order to prevent the following train from getting to the platform until the leaving train has completely vacated the station.

The installation of this manual system of permissive signals could be so installed as to become a part of the complete recommended automatic speed control arrangement; its operation would not detract from the safety of the present block system, and its use would add at least two express trains per hour to the rush hour capacity of the subway as at present operated.

MODIFIED BLOCK SYSTEM TO BE USED PENDING DEVELOPMENT OF RECOMMENDED IMPROVEMENTS.

A manual means of clearing signal No. 47 (near Grand Central Station) so that a train can pass it should be provided, to be used only when the schedule is actually in danger of delay. This manual system can be installed in such a way as to make the total time saved over present conditions at least 17 seconds, with a possibility of saving the entire 23 seconds now required to clear the station block and overlap.

The requirements of the suggested manual permissive system have already been described, and as the expense of its installation is small and its effect on the train schedule will be marked, I suggest that this change be made, provided the officials of the company feel warranted in adopting it, but as it is more of a temporary operating feature than a permanent engineering improvement, it need not be insisted upon.

As there is an interlocking plant at Ninety-sixth street controlling the movement of the trains at the cross-over at that point, it is entirely practicable to install a manually operated permissive system at this point also. I would therefore suggest that the Interborough Rapid Transit Company revise its Ninety-sixth street signal layout to conform to the requirements of the suggested manual permissive system already described in this report as well as to use practically the same layout which has been approved and recommended by me for all other express stations. The changes in the signal system at all the express stations will thus be made in accordance with a uniform plan which normally will save approximately 7 seconds, but which will make possible an additional saving of at least 10 seconds at each point, thus making a total saving of at least 17 seconds upon the present 2 minute headway.

SIGNALS ON LOCAL TRACKS.

In considering the necessity of installing signals and automatic stopping devices on the local tracks of the subway, it is clear that the same considerations of safety that govern their installation on the express tracks should apply as well to the local tracks, i. e., a passenger should be as safe on a local train as he is on an express train.

Practically the only difference between train movements on the local tracks and those on the express tracks, is that more frequent stops are made by trains on the local tracks. The acceleration, maximum speed and retardation are practically the same for the two classes of service. The time interval between trains is also approximately the same. Further, from considerations noted above, it follows that the introduction of a stop between the terminals of a railroad introduces a risk, and, therefore, tends to lower the degree of safety by making this safety according to present practice depend more or less upon the agency of the motorman. Clearly the oftener this is done the more frequently is the risk assumed, resulting in a lowered degree of safety.

South of Ninety-sixth street the number of stops of the local service of the subway is about five times that of the express service. It would, therefore, appear that if the practical degree of safety decided upon for subway operation demands the installation of a block system and automatic stopping devices on the express tracks, the same or similar equipment is necessary on the local tracks.

The introduction of a stop between the terminals of a road introduces features that tend to increase the necessary headway between trains, and, therefore, reduces the transportation facilities of the road.

Conditions introduced by a single stopping point may determine the minimum permissible headway of all trains on the road passing that point. The stopping point requiring the maximum wait in general determines the minimum headway. The introduction of other stopping points will not influence the headway, so long as the stops are far enough apart to permit the trains to reach a speed equal to that which they would reach were no such stops introduced.

Since the stopping points on the local service which coincide with the stops on the express service are the ones which require the longest station waits, and, therefore, determine the headway of the local service, as they do of the express service, it would appear that, if a certain headway can be maintained on the express service, the same headway can be maintained on the local service when operating under the same conditions of safety, particularly in view of the fact that conditions tending to prolong waits at limiting points on the local service are not so pronounced as they are on the express service. As the local and express trains alternate on the same tracks north of Ninety-sixth street, it is desirable that the same headway should be maintained on both services south of Ninety-sixth street. As far as the block system is concerned there is nothing to interfere with such an arrangement up to the capacity of the express tracks, which can eventually be operated with a headway of 90 seconds corresponding to 40 trains per hour, although it cannot be denied that the introduction of the block system on the local tracks will reduce their possible capacity from 50 trains per hour to 40 trains per hour. Inasmuch as there are now being operated on the local tracks during rush hours only about 30 trains per hour, it will be seen that the block system possessing the speed control principle can be installed upon these tracks and at the same time permit an increase in the number of trains of 33⅓ per cent. over the present number, although until the Ninety-sixth street crossovers are eliminated by the improvements now authorized, there will be short intervals during which this rate cannot be maintained.

There is an added reason for considering the advisability of applying signals and automatic stopping devices on those portions of the subway north of Ninety-sixth street, and particularly on the elevated portions. There is undoubtedly a strong tendency for the motormen to relax somewhat when coming out into the open. At least, opportunities for diversion are greatly increased, with the resultant effect of lowering the efficiency of the motormen. Automatic block signals and stopping devices to enforce observance of the signal indications are needed here to as great an extent, if not greater, than on the underground portions of the road.

On the other hand it is true that millions of passengers are carried annually upon the other elevated roads in the city

which are not equipped with a block system and automatic stops and that this is done with an infinitesimally small percentage of accidents. It is said that it can easily be shown by statistics that a person is safer in an elevated or local subway car than when walking on the street. These considerations, however, do not remove the obligation of providing the greatest degree of safety practicable.

I, therefore, recommend that when the speed control system hereinbefore described has been perfected, such portions of the subway tracks supplying local service as are not now protected by the block system, be equipped with block signals and automatic stopping devices which will always insure a degree of safety and capacity equal to that obtained on those portions supplying express service.

BROKEN RAIL PROTECTION.

The track circuits in use in the subway are of the single rail type in which one rail of each track is used as a common return, and connected in multiple with the return rails of the other tracks. The single rail track circuit with multiple connections for the return rail permits the current of one track to use the rails of the other tracks for a return in case the return rail should break or be removed, and, in consequence, the signal at the entrance of the block will not be made to indicate stop when there is a broken or removed rail. Although it is true that track rails seldom break under subway conditions, there is the possibility that this may happen, or that a rail may be removed from the track, as is often the case when repair work is under way, in which latter case, if trains were not properly flagged, a derailment might occur. The protection desired may possibly be obtained by putting reactance coils in the cross bond connections and at other points were required, but if such an arrangement is not adopted, track circuits of what is known as the two-rail type may be used. This type of track circuit had not been perfected at the time the signal system was installed in the subway, so the criticism cannot be made that the two-rail circuit should have been put in in the first instance. Furthermore, as the two-rail system has been in use so short a time it has not had an opportunity to demonstrate its superiority sufficiently to justify the abandonment at the present time of the single rail system which has proven to be so efficient in the present subway.

As an offset to the expenditure necessary to the installation of this two rail system, it may be said that it will reduce the electrical loss by allowing the use of both track rails for the return of current from the train motors to the power house and thus effect a considerable annual saving in the cost of operation. As it is probable that when the subway is improved and operated at its maximum capacity, additional electrical conductors will be required, advantage can then be taken of the extra rail on each track which is not now being utilized as a conductor. In this way the investment required to secure broken rail protection will be more than offset by the saving in the cost of electrical conductors, and thus at this time the improvement could be secured with the minimum investment.

While I believe that this improvement should be eventually used in this subway, its advantages are not sufficient under present conditions, to justify the investment that would be required to secure it at once. It should, however, be considered for all extensions of the present subway and upon all future subways.

CONCLUSIONS.

Briefly stated the conclusions which I have reached in the preparation of this report are as follows:

1. The subway block system is in the main modern, effective and well maintained.

2. There is no reason so far as the block system is concerned why a 90-second headway cannot be maintained.

3. This 90-second headway will eventually be desirable upon both the local and express tracks.

4. The block system does not at present afford positive safety at the approach to stations, as the motormen are relied upon to reduce the speed of the trains.

5. In addition to the excessive platform waits additional time is lost at each station stop by holding the following train a considerable distance out of the station until the leading train has entirely cleared the platform.

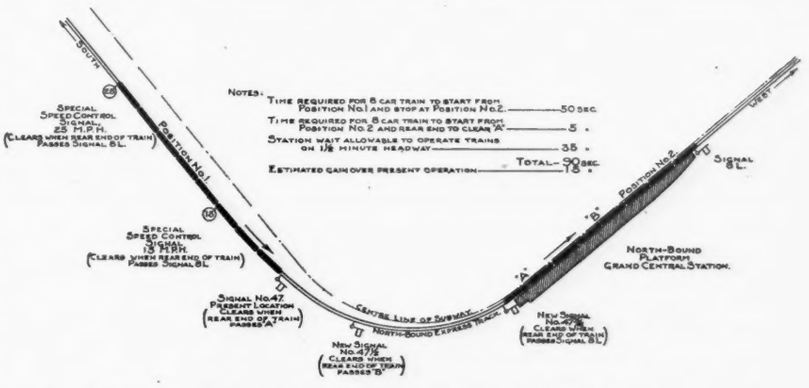
6. As at present operated, delays at a station platform have a cumulative effect upon following trains so that even one prolonged stop may start a series of delays which may disarrange the schedule for an entire hour.

RECOMMENDATIONS.

The changes I have recommended may be briefly summarized as follows:

1. That the necessary steps be taken to develop and install an automatic speed control block system to be used as an auxiliary at station blocks which will allow the incoming train safely to approach the rear of the train at the platform and to enter the platform promptly upon the leaving of the outgoing train without sacrificing any of the factor of safety which is now maintained between stations.

2. That during the development of the system there be installed at every express station the changes in the block system proposed by the Interborough Rapid Transit Company for Grand Central Station. The equipment required for these changes will reduce the present possible headway by 7 seconds, and could ultimately become a part of the permanent recommended arrangement.


South
Special Speed Control Signal, 25 M.P.H. (Clears when rear end of train passes Signal 8L.)
Position No.1
Special Speed Control Signal, 15 M.P.H. (Clears when rear end of train passes Signal 8L.)
Signal No.47 Present Location Clears when rear end of train passes A
New Signal No.47½ Clears when rear end of train passes B
Centre Line of Subway
North-Bound Express Track
Notes:
Time required for 6 car train to start from Position No.1 and stop at Position No.2 ——— 50 sec.
Time required for 6 car train to start from Position No.2 and rear end to clear A ——— 5 "
Station wait allowable to operate trains on 1½ minute headway ——— 35 "
Total — 90 sec.
Estimated gain over present operation ——— 7½ "
Position No.2
Signal 8L
North-Bound Platform, Grand Central Station.
New Signal No.47½ Clears when rear end of train passes Signal 8L.

Signals at Grand Central Station, Interborough Subway, New York.

3. That the subway officials consider for the purpose of effecting temporary relief the installation of a manually operated permissive signal at every express station to be used to expedite a delayed incoming train and thus overcome the cumulative effects on the schedule of a prolonged station wait.

4. That the local tracks be protected by a complete block system when the automatic speed control system herein suggested has been perfected.

5. That, when the load on the subway increases to such an extent as to require additional conductors for carrying the electrical energy to and from the trains, the present block system be altered so as to utilize both rails for carrying the return current, and at the same time make the system conform to the latest accepted practice whereby the block system detects and indicates a broken or removed rail, provided the system shall at that time have proven superior to the single rail system.

Mr. Arnold adds an appendix containing diagrams showing various proposed changes in the location of signals at Grand Central Station and Ninety-sixth street, which have been suggested by the Interborough Rapid Transit Company;

braking diagrams and train spacing and speed time diagrams. The curves in these diagrams show that if the capacity of the subway is to be increased by changing the speed of trains the maximum speed must be reduced from 40 miles an hour to 30 miles an hour, as if the minimum length of a block section is to be 500 ft., which is the length of a 10-car train—the critical speed for maximum capacity is 30 miles an hour. The accompanying illustration shows the location of speed control signals on the northbound express tracks at Grand Central Station as recommended in the body of the report.

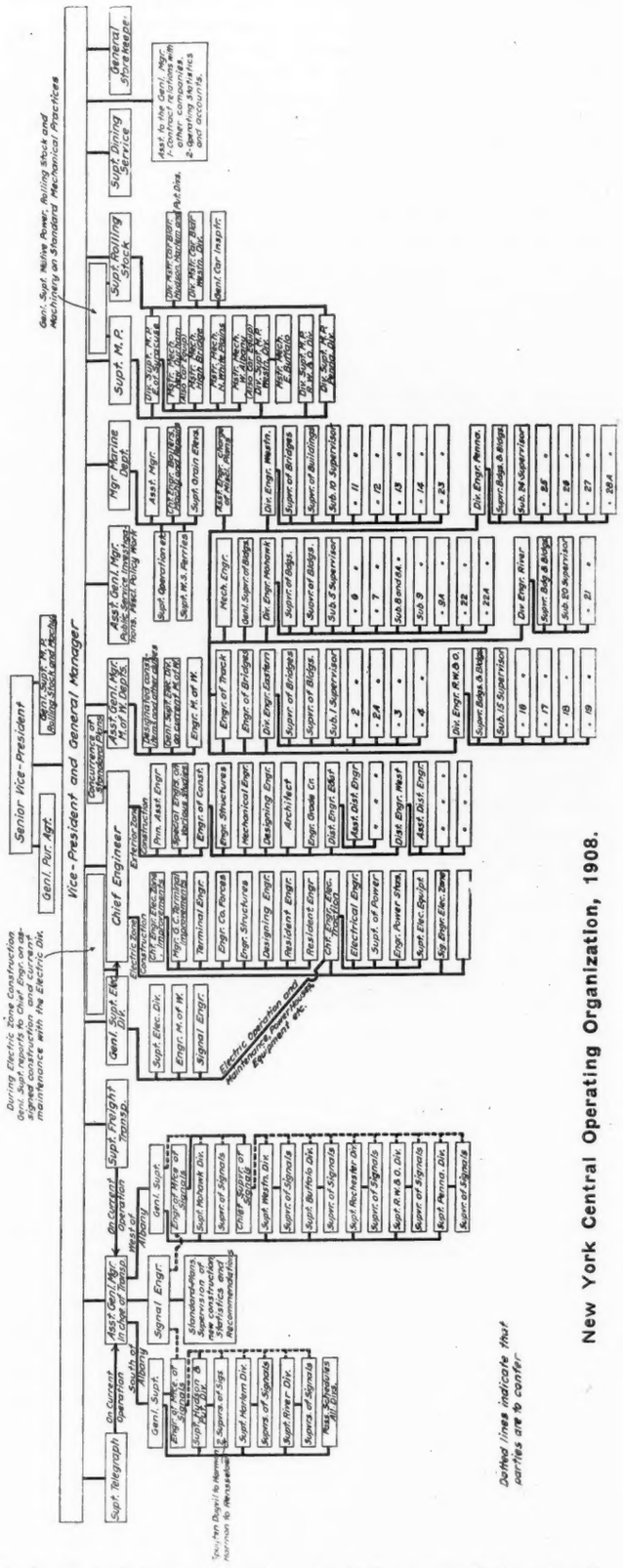
NEW YORK CENTRAL OPERATING ORGANIZATION.

The accompanying chart shows the organization of the operating department of the leased and operated lines of the New York Central, which went into effect last March. As a matter of fact it represents no important change from the practice of the last year or so, but doubtful points have been cleared up and jurisdictions have been made definite instead of vague.

Like the organization of every other American railroad, it is designed to fit local conditions and consequently is neither purely divisional nor purely departmental. We have always taken the pure type of a departmental organization as that typified by English practice (now growing rare), where the head of the mechanical department is on an absolute parity with the general manager, so far as authority over his department is concerned, and reports to nobody but his board of non-technical directors. No road in the United States has an organization like that, fortunately, but there is a fairly well defined division of practice between a departmental organization, such as that possessed by the Lackawanna, for example, where each department head reports to the president, and that of the Pennsylvania, which endeavors, so far as possible, to make the division the unit and to place full powers in the man at the head of the division.

The present New York Central organization may be called quite purely departmental, because, although the vice-president at the head of the operating department concentrates upon himself authority over transportation, signaling, way and structures and motive power, his functions in the present case correspond fairly closely to those of the president of the average railroad. It might be said that Mr. Smith, under the present New York Central organization, is in full charge of conducting operations as they stand, but that when the nature of these operations is to receive some important change, either through acquisition of mileage, or large purchases, or change in policy, the question is carried up to Mr. Brown, Senior Vice-President, and through him to Mr. Newman, who is a very active President indeed.

But the curious and interesting part of this operating organization is the fact that the company would doubtless be glad of a chance to make its organization purely divisional, and is working definitely towards that end. The thing which is ultimately desired is to develop a group of division superintendents good enough to be general managers; each one, in point of fact, a general manager over his own division, and competent to deal with situations requiring expert knowledge in mechanical and operating lines as well, and also, to a certain extent, in traffic matters. Men have to be trained for this and the training has to begin early and extend through a number of branches of the service; but when the right material has been developed and the entire system can be operated as a series of division units, with authority extending out through the division superintendents to the general superintendents and the general manager, while a staff of technical specialists has been built up to be responsible for design, it is believed that the ideal organization will be reached. The Pennsylvania has already come measurably close to this type of ideal divisional organization. The New York Central is working towards it by way of the departmental.



In Japan there are a number of railroads operated by manpower—by coolies. The principal one connecting Atami, a celebrated bath and health resort with Odawara, is 15 miles long. It passes along the Japanese Riviera and the running (?) time is 3½ to 4 hours. In Kumamamoto there is a

similar road and in six other localities additional ones are being built. It is now proposed to consolidate these different companies, the consolidated company to have a capital of $1,250,000, on which a return of 13 to 14 per cent. is expected.

OVER-CAPITALIZATION.

BY HENRY FINK,
Chairman of the Board; Norfolk & Western.

The term capitalization is generally applied to the capital shares, and bonded debt combined, although the latter constitutes a debt, and is in no sense part of the capital of a railroad company. The reason for this misapplication of terms probably is that very few American railroads were built from the proceeds of the sale of their capital shares. Nearly all of the companies were obliged to use their credit and borrow sufficient money for the completion of their roads, and to issue bonds of various kinds as security for their debts. It is presumed that the money so borrowed has been honestly invested in the railroads, and is represented by adequate property, and that therefore the bonded debt may be considered a part of capitalization. The term over-capitalization may be defined in several ways. For example:

1. When a railroad corporation has not received an equivalent in cash or in property, for the par value of its stocks and bonds, the corporation may be said to be over-capitalized to the extent of the difference between such par value and the money realized.

2. When the par value of the stock and bonds issued exceeds the fair value of the property represented by such issues.

3. If the earning capacity is the true measure of the value of a railroad (as I believe it is), then a railroad is over-capitalized when for any reason it is unable to earn its fixed charges, and a reasonable dividend on its capital shares.

According to the last definition, the capitalization of a road may be very low, and still it may be over-capitalized, because of insufficient earnings.

When a railroad is unable to earn the interest on its bonded debt, the evil of over-capitalization corrects itself, through bankruptcy and reorganization.

Whatever definition may be adopted, it is necessary to discriminate between over-capitalization that is legitimate because unavoidable and harmless, and over-capitalization that is due to fraud and trickery of dishonest promoters, and which carries in its train many material and moral evils.

Over-capitalization in the sense that the par value of the stock and bonds has not been realized is obviously unavoidable, because railroad companies which have to borrow money must necessarily pay what the money is worth at the time they borrow it; and they must offer inducements to investors by agreeing to pay a high rate of interest, or by selling their securities below their par value. The amount of such discounts must vary with the varying credits of the borrowing companies. It follows that except in cases where the credit of a railroad is exceptionally high, there must always be some "water" in stocks and bonds. The only way to prevent this would be to prohibit railroads from selling their securities below par. This, of course, is impracticable.

The history of the early days of American railroads furnishes a striking illustration of the fact that capitalization has no direct relation to railroad rates. In the early days railroad companies generally received par value for their stocks, and they issued no bonds until a basis of credit had been created by the construction of a part of their roads from the proceeds of the sale of the stock. In many cases these roads were built in anticipation of the future needs of the people. The traffic which was to support them had to be created. The charges for transportation were very high, but the people were glad to avail themselves of the improved facilities, and did not demur so long as the charges did not equal or exceed those by wagon or river and canal transportation. The charters in many cases prescribed maximum rates, which, however, were much greater than the traffic could bear.*

Section 1242 of the Virginia Code of 1887 provides:

"When the net profits of any company heretofore or hereafter incorporated, which may be governed by this chapter, shall be such that, but for this section, dividends might be declared out of the said profits exceeding the rate of fifteen per centum per annum on the capital stock invested, laws may be passed for reducing the toll of the company. But no law shall reduce the tolls so as to prevent dividends of 15 per centum per annum, within 30 years from the time the first dividend of profits of the said company was declared, or so as to prevent dividends of 12 per centum per annum after the said 30 years and before 50 years from the same time, or so as to prevent dividends of 10 per centum per annum after the said 50 years."

As state and federal railroad commissions were unknown in those days, one might suppose that the railroads would have charged such rates as might have given them a reasonable return on a fair value of the property used. But experience proved otherwise. Advances in rates resulted in diminished traffic and earnings; and many of the roads were forced into bankruptcy. In these cases the capitalization was low, but nevertheless the roads were over-capitalized; and as a result, the capital invested in them was sunk in whole or in part, except in cases where the owners were able to invest additional capital for the extension of their road to regions which afforded more traffic. In such cases over-capitalization was corrected by an increase of the capital.

At another period we find that over-capitalization by the issue of stock on which par value was not realized became the recognized method of raising capital for the construction of railroads through the undeveloped country of the West and Middle West. In some cases stock was given as a bonus to the purchasers of the company's bonds. This was necessary in order to assure capitalists who had seen one railroad after another go into bankruptcy, an ample reward for their risks.

At one time it was a common practice to issue stock to contractors in part payment for constructing railroads. Of course in such cases the par value of the stock was not realized.

It is often asserted that the payment of stock dividends contributes to over-capitalization or stock-watering. This is true only when such payments are based upon false accounting, or other deceptive methods. In such cases the practice must be classed with fraudulent over-capitalization. When based upon an honest accounting, the stock dividend shares represent earnings which were expended on the property, instead of being divided in cash among the shareholders.

It is frequently pointed out that the issue of stocks and bonds in payment for railroads which have passed through bankruptcy, and are reorganized, results in over-capitalization. This may be and often is the case; but it does not follow that such over-capitalization is illegitimate or harmful. One of the main objects in reorganizing a railroad company is to cut down its fixed charges so as to bring them within the earning capacity of the road during periods of lowest business depression. In order to attain this object owners of certain mortgage bonds of the old company agree to accept bonds of the new company, but to a less amount as to principal, and frequently at a reduced rate of interest. In consideration of this sacrifice of capital and interest, they receive certain stocks upon which dividends are payable only when a revival of business and the growth of the traffic enable the new company to earn such dividends. And stocks so issued are in no sense fictitious. They represent actual values, and are drafts, for value received, on more prosperous times. In many cases such drafts have been honored. A good illus-

*A Kentucky charter of 1829 fixes a maximum rate of 3⅓ mills per 100 lbs. for a distance of 20 miles or less; 3 mills for over 20 miles and under 60 miles, and 2½ mills for 60 and over 60 miles.
A Maryland charter of 1831 fixes a maximum rate of 3 cents per ton per mile.
A Georgia charter of 1827 fixes a maximum of 25 cents per 100 lbs. for heavy articles and 10 cents per cu. ft. for light articles.

tration of this is afforded by the result of the second reorganization of the Norfolk & Western Railroad Company in 1896.

After the first reorganization in 1881, millions of dollars were expended in improving and extending the road, and in furnishing increased transportation facilities to the public. Private persons and corporations also invested millions in manufacturing and mining enterprises along the line of the road. But, unfortunately, the development of the country did not keep pace with these investments. Many of the enterprises came to grief; and the railroad company, being unable to earn its fixed charges, was put into the hands of receivers for the second time, in 1895.

At the reorganization in 1896 the new company issued $62,500,000 of first mortgage 4 per cent. bonds, to be used as follows:

A. $23,322,675 to be used to provide for the disturbed bonds of the old company and to carry out the plan.

B. $25,986,889 to be reserved for the purpose of taking up or paying the undisturbed bonds at their maturity.

C. $3,500,000 to be reserved or deposited in trust, subject to suitable restrictions, for the purpose of taking up or paying any existing obligations which shall not be taken up or paid out of funds received by the committee, and for other necessary purposes of the new company.

D. $9,690,436 to be reserved for the construction or acquisition of side-tracks, second-tracks, branches and equipment, and for other improvements and additions to the property covered by the first consolidated mortgage, and for other requirements of the new company; but such bonds are to be issued only subject to suitable restrictions to be prescribed in the mortgage securing the same, and at a rate not exceeding $1,000,000 for each fiscal year after June 30, 1896 (the first fiscal year being that ending June 30, 1897); it being understood that any portion of such $1,000,000 of bonds remaining unissued in any one fiscal year may be added to the amount which may be issued in subsequent years.

It also issued $23,000,000 of 4 per cent. non-cumulative adjustment preferred stock—shares of $100 each—and $66,000,000 of common stock—shares of $100 each. The shareholders of the common stock of the old company were required to pay an assessment of $12.50 per share for participating in the reorganization and retaining their interest in the road.

The following table will show the scaling down of the disturbed securities and the issues and percentage of stock to such security holders as compensation:

Disturbed Securities.	Per cent. received in— Cash.	1st Cons. Mtg. bonds.	Pf. stock.
Adjustment mortgage 7 per cent. bonds	7	130	20
100-year mortgage bonds	..	62½	75
Maryland & Washington dividend bonds	..	70	67½
Clinch Valley dividend bonds	..	50	70
Equipment mortgage bonds of 1888	..	100	48
5 per cent. debentures of 1892	..	...	100
Roanoke & Southern Railway Co. bonds	..	55	65
Lynchburg & Durham Railroad Co	..	35	65
N. & W. Railroad common stock	..	...	*75
N. & W. R.R. pf. stock, on payment of $12.50 per share deposited			112½
Roanoke & Southern Ry. stock, on payment of $12.50 per share deposited			75
Lynchburg & Durham R.R. Co. stock, on payment of $12.50 per share deposited			75

*Common stock above 75.

There can be no doubt that in 1896 the road was largely overcapitalized, in the sense that the earnings were insufficient to pay fixed charges and dividends on the capital shares. No one dreamed that any dividends could be paid on the common stock for many years; hence it sold in the market at very little above, and at times below, the $12.50 per share of cash assessments. But owing to the revival of business and the ensuing unexampled prosperity of the country and the great development of the resources of the region traversed by the road, the company earned and was able to pay a dividend of 1 per cent. on its adjustment preferred stock in November, 1897, a like dividend in February, 1898, and a 2 per cent. dividend in August, 1898, since which time semi-annual dividends have been paid regularly on this stock. In June and December, 1901, and June, 1902, dividends of 1 per cent. were paid on the common stock. From and including December, 1905, 2 per cent. dividends were paid on it semi-annually until after the June payment of 1906, and since December, 1906, dividend payments have been at the rate of 5 per cent. per annum, the market value of the common stock at times approaching closely to par.

Fraudulent overcapitalization through stock issues which represent no property or values, and made for the purpose of affording greater opportunities for speculation or gambling, and for obtaining or retaining by trickers a controlling interest in the road, or for other illegitimate purposes, cannot be too severely condemned. It is a crime differing only in degree from forgery of stock certificates, and it is frequently accompanied by false reports, dishonest accounting and other misrepresentations and methods of deception. There was a time when these practices obtained to a considerable extent, to the disgrace of the railway management of this country.

Happily, overcapitalization of this sort has become rare. The evil effects resulting from it, though serious, affect shareholders of the railroads concerned more than they do the public. Generally these effects are but temporary, because the operation of economic laws soon results in the correction of the evil. Wall Street can always be relied upon to promptly squeeze out the "water" from such stocks.

While there are many railroads in this country which do not earn an adequate return, even in times of great prosperity, there are few which can be said to be overcapitalized in the bad sense of the term. Certainly the aggregate capitalization of American railroads is below their real value. This has been shown by the history of these railroads and by a comparison with the capitalization of railroads in England and on the continent of Europe.

Prof. H. C. Adams, the statistician of the Interstate Commerce Commission, states on page 34 of the Eighteenth Annual Report on the Statistics of Railways in the United States for the year ending June 30, 1905, that the aggregate amount of capitalization of all the railroads in the United States was.....$13,805,258,121

But on page 55 he says that this amount overstates the capital, as it does not allow for an admittedly proper deduction of amounts of stocks and bonds in *other* railroads which are owned by the railroads themselves, and on page 58 he says such amounts were:

Stocks	$2,070,052,108	
Bonds	568,100,021	
		2,638,152,129

Leaving the real aggregate *capitalization*.....**$11,167,105,992**

On page 99 of the report he gives the *cost* of all the roads in the United States as.....$11,170,458,581

And of their equipment 780,890,368

11,951,348,949

Excess of cost over capitalization..... $784,242,957

It will thus be seen that the capitalization of the railroads of this country is less than their cost by nearly eight hundred million dollars.

And as will be seen from the following figures taken from the Report on Transportation Routes and Systems of the World, issued by the Department of Commerce and Labor at

Washington, the capitalization of the European railroads is much in excess of that of the railroads of this country:

Capital or Cost, per mile of railroads.

1904	United States	$55.261
1904	Canada	60,504
1899	Uruguay	52,756
1904	Venezuela	70,972
1903	Germany	98,443
1903	Austria	128,334
1903	Hungary	74,056
1903	Belgium (state roads only)	160,893
1902	France	137,601
1903	Switzerland	104,969
1904	United Kingdom	272,737
1902	Russia	78,553
1902	Finland	32,189
1904	Norway	38,371
1904	Sweden (state railroads)	44,669
1902	Sweden (private railroads)	22,006
1902	Italy	108,212

The issue of railroad stocks is subject to the regulation of the states which created the corporations through the original charters or bylaws enacted subsequently. For instance, in Virginia the Corporation Commission, and in New York the Public Utilities Commission, have power to regulate such issues. The constitution of Illinois, adopted in 1870, provided:

"No railroad corporation shall issue any stock or bonds except for money, labor or property actually received and applied for the purposes for which such corporation was created, and all stock dividends and other fictitious increase of capital stock or indebtedness of any corporation shall be null and void."

It is now proposed that the federal government assume the regulation of such matters; and as the commerce clause of the federal constitution, when stretched to its utmost limits, may not prove adequate for the purpose, and in view of the fact that an amendment to the federal constitution involves great difficulties and delays, it has been suggested that the seventh clause of Section 7 of Article 1 of the constitution, in regard to post roads, be utilized, and that by means of a new construction of the constitution the federal government usurp the power reserved by the states. This regulation is not to be confined to railroads, but is to be applied to all "big corporations," whether affected by the public interest or not.

It will be seen from President Roosevelt's speeches that while he is of the opinion that, with the exception of some isolated instances, American railroads are not overcapitalized, he nevertheless recommends that Congress make provision to enable the Interstate Commerce Commission to undertake the physical valuation of each and any road in the country, whenever, in the opinion of the Commission, such valuation of any road would be of value to the Commission in its work. It is not unreasonable to suppose that if the President would carefully investigate the subject, he would find that in view of the obvious fact that the value of railroad properties has no relation to the rates, and cannot be used as a criterion of their reasonableness, such valuation cannot be of any value to the Interstate Commerce Commission in its work. He will also find that the injuries resulting from overcapitalization to the wage-earner and to the public, which is concerned in the rates paid by the shipper, are wholly imaginary. It is true, however, that the Interstate Commerce Commission might favor an official valuation of the railroads, because it would furnish a convenient justification of some of its orders that carriers make radical reductions of individual rates, or of rates on whole classes of business, for so long as the earnings derived from other sources of traffic can be shown to be sufficient to yield the carrier what may be considered a reasonable return on the value of the property as ascertained by the official valuation, it would be impossible for the carrier to appeal to the federal courts for the reversal of such order with any hope of success, no matter how unreasonable the reduced rates ordered by the Commission might be in and of themselves.

It is obvious that the owners of the railroads would have no redress when an order of the Commission deprived them of a reasonable compensation for services rendered, and that they could only appeal to the courts for protection in cases of actual confiscation of their property.

The President's suggestion that the clause of the Constitution granting the national government power to establish post roads, by necessary implication confers upon the federal government control over railroads, whether their business is intrastate or interstate, derives importance from the great weight his opinions have with the people and with their representatives in Congress of both political parties.

The question of effecting changes in the Constitution by construction, instead of by amendment, has already been discussed by able members of the legal profession. Our concern not being with legal questions, but with the probable practical effect of proposed measures for the regulation of railroad rates, we will briefly consider whether any additional legislation, having for its purpose the enlargement of the powers of the federal government, is needful, if it were found to be practicable.

It cannot be denied that a dual control of railroad rates by the states that created these corporations and by the federal government, which obtains control through the commerce clause of the Constitution, has its serious disadvantages. In many cases the rates between points within a state necessarily affect the interstate rates, and very frequently the latter are based upon the former; hence it may be said that in such cases the state and the federal government exercise jurisdiction over the same subject matter. The fact that in the past no serious difficulties have been experienced from this dual control, is due in part to the success which has attended the efforts of traffic men to adjust rates in compliance with the requirements both of state and federal commissions, but more particularly to the conservatism that has marked the action of the state legislatures and state railroad commissions. Unfortunately many of the states have in recent times departed from that conservative policy. They have not only ordered radical reductions in rates on intrastate traffic, especially in the passenger rates, but in some cases are enforcing by legislation or through state railroad commissions certain rules and regulations in the conduct of intrastate business that must affect the interstate traffic of the roads.

Much of the legislation referred to is ill-advised, and in its results must prove detrimental to the material interests of the states that enacted it. The writer hopes and believes that when the people begin to feel the injurious effects, as they must, sooner or later, we will see such laws as are fraught with the greatest mischief amended or abolished. In the meantime it is, in the opinion of the writer, not needful or advisable for Congress to enlarge the powers of the government so as to give it jurisdiction over intrastate traffic. This opinion is based upon the fact that the government, under the Constitution and existing laws, has already ample power to regulate rates on interstate traffic, even though intrastate rates may be involved in such regulation. The commerce clause was adopted by the framers of the federal Constitution for the avowed purpose of preventing the states from obstructing traffic between the states and with foreign countries. A law passed by Congress under that clause is the supreme law of the land, and a violation of such law by a state, whether directly or through the exercise of its power over intrastate traffic, is unconstitutional, and will be so declared by the Supreme Court of the United States.

In view of recent railroad legislation by states, the management of systems which traverse six or more states, if they had their choice, would naturally elect to serve but one, instead of six or more masters. However, at the present stage of the evolution of railroad regulation, the discussion of the question of transferring the direct control of intrastate traffic to the federal government appears to be purely academic.

The suggestion that the federal government assume the regulation of stock and bond issues, in order to prevent overcapitalization and protect individuals who may desire to invest in railroad securities, involves some interesting questions as to the legitimate sphere of the government's interference, what is to be the limit of such interference with the freedom of the

individual, and what human action should remain under the exclusive jurisdiction of the individual.

So far the kind of socialism which proposes to use the power of the government for the regulation, not only of production and consumption but of every detail of life, for the purpose of neutralizing the effects of innate inequality of man, has not found favor in this country. Socialism of this kind is imported. It is foreign to this country, and cannot flourish among a people of practical common sense who habitually pay more attention to facts than to theories based on mere assumption. It is true, however, that occasionally men occupying high positions express opinions on the functions of government which the most advanced socialist might indorse, but these opinions do not meet with general acceptance. Freedom of the individual within the law, that is, limited individualism and equality before the law, are underlying principles of American governments. It may be said that in the sphere of economy the government policy has been one of *laissez faire*. Under this policy the country has grown to be what it is, and it is steadily gaining in power and material prosperity because of the large measure of liberty and the wide scope given to individual energy and skill in the development of its immense resources. It is a historical fact that the opposite policy, that of *fueur de gouverner*, which prevailed in France in the eighteenth century, nearly strangled every branch of French industry, and brought about starvation of the people.

The country is suffering from an excess of railroad regulation. Much of it is ill-considered. In many cases the remedies are worse than the evils they are designed to cure. We have seen that the best remedy for overcapitalization due to insufficiency of earnings to pay fixed charges and return on the capital stock lies in the growth of the volume of the traffic. In such cases a restriction of the issue of stock cannot affect its intrinsic value. Its market value is determined by appraisements made in Wall street, and such appraisements afford a better protection to investors than any government regulations. Indeed it is difficult to understand how such regulation could give any protection at all, even if it were a function of government to protect individuals against the consequences of their own errors of judgment. That overcapitalization is an evil cannot be denied, but it would seem irrational to shackle commerce and industry and their instruments by an attempt to abolish by legislation an evil which is corrected by operation of economic laws.

PICKED UP ON THE ROAD.

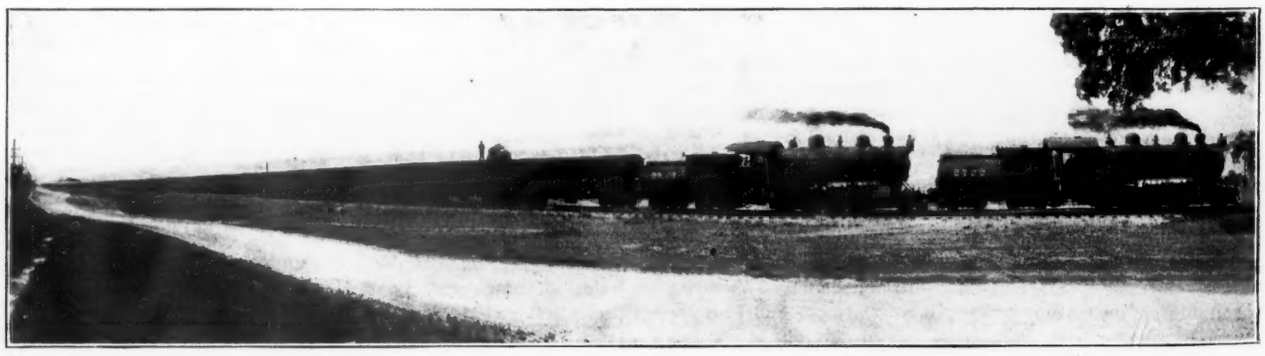
BY GULF.

I believe I have had occasion to allude to the attitude of the passenger towards the Pullman porter, and may have made the exceedingly trite remark that the tipping of the said porter is looked upon as a modified form of blackmail, and that few really want his personal service. My recollection is, too, that I have noted how the refusal of the front passenger in a parlor car to allow himself to be imposed upon is often a signal for a general revolt all down the car. This indifference to the services of the porter has been emphasized recently on the Pennsylvania, between New York and Philadelphia, and on the New Haven. Whether it is due to the action or orders of the company or not I have not inquired. But on these runs the porter leaves the passenger at peace. He neither appears with the whisk broom and the ubiquitous bow to "brush you off," nor does he lean over you and seize your satchel and carry it off in hope of reward. He kindly leaves you alone. Now, although the car has a push button at every seat by which the highwayman can be summoned, I have not yet seen it used by a single passenger on any of my frequent trips between New York and Philadelphia. The passenger is allowed a freedom of coming and going that is quite delightful, and I think it is appreciated accordingly. Certainly thanks are due to the party responsible for the reform, and to whomsoever he may be, they are hereby duly rendered and recorded.

Once upon a time the shoemaker was advised to stick to his last. I often think that the same advice might well be given to the great railroad magnate who essays to talk of cars and locomotives, and tell the condition of things to the reporter that has been granted an interview. I met one once who wisely decided the kind of motive power he would use, and then, when a picture of his engine was shown him, asked what they called it, anyway. As I write, I have the interview of a very great man before me, who gravely informed the reporter that the nosing of engines was due to the fact that they were so high and that "the swaying back and forth that accompanied it meant that the center of gravity had crept up just about as high as it could without having the engine topple over when it got into action!" When Wall street starts in to talk mechanics, the instant suggestion is that it is better not to know so much than to know so much that isn't so!

SOUTHERN PACIFIC ORANGE TRAIN.

The accompanying cut shows a train load of oranges on the Southern Pacific, consisting of 46 "Pacific Fruit Express" cars with a caboose, the whole being propelled by four locomotives. Two of the engines are at the front of the train and the other two are 11 cars ahead of the caboose. Trains are run in this way up the west slope of the Sierra Nevada mountains where for nearly the whole of the way, 83 miles, the grade is 2.2 per cent. Trains of 45 to 50 cars are regularly run up this grade in this way, and they are run through without remarshaling of the cars, from Roseville, Cal., to Sparks, Nev. The four standard consolidation freight engines have each a tractive force of 43,305 lbs. The gross weight of the train is 1,933 tons, while the rating of the four locomotives on the grade is 1,900 tons. This train was 2,324 ft. long.



Southern Pacific Orange Train; Four Engines, 46 Cars, 2.2 Per Cent. Grade.

General News Section.

Work was resumed in the Chicago & Alton motive power and car shops at Bloomington, Ill., on July 1, with a full force of men and a 9-hour day schedule.

The Union Pacific now has a passenger motor car running regularly between Valley, Neb., and Omaha, going to Omaha in the morning and returning in the evening. A motor car is also running between Denver, Col., and Pierce, 65 miles.

The Chicago, Rock Island & Pacific has appealed to the Oklahoma Supreme Court from the order issued by the State Corporation Commission, requiring the road to build a track to certain elevators at Apache and to provide better loading facilities.

The State Railroad Commission of New Jersey has begun its first mandamus proceedings in the courts to compel a railroad to comply with one of its orders. The order, issued last April, required the reopening of the station of the Delaware, Lackawanna & Western at Wyoming, N. J.

The Pullman Company has closed its buffets in certain parlor cars on the Chicago & Alton, and, according to the reporters, is likely to discontinue the sale of liquors throughout Illinois on account of the changes which have lately been made in the laws, increasing the number of towns in which the sale of liquor is illegal.

In the district court at Bastrop, Tex., June 29, the Houston & Texas Central Railroad Company was fined $2,800, in a suit brought by the state, for violation of the act of 1905, requiring railroad companies to maintain water closets and keep them lighted and in a sanitary condition. The court instructed the jury to find for the plaintiff.

The recent press reports to the effect that the Delaware, Lackawanna & Western would, in the near future, substitute bituminous for anthracite coal in its locomotives, are without foundation. An officer says that this report doubtless arose from some experiments made on the switching engines at Scranton, Pa., when bituminous coal was mixed with anthracite.

The Interstate Commerce Commission has reminded certain railroads that the clause of the federal law permitting the issuance of passes to the families of railroad officers and employees does not allow the free transportation of servants; and, according to the reporters, "this construction of the law will work a hardship on officials everywhere in the United States."

The salaries of the general officers of the Southern Railway and its controlled lines, and their office forces, which were reduced last February, have been restored. It was expected at that time that the reduction in salaries of the officers and their office forces would be followed by a general reduction in wages. This not having been made, but being further postponed (as announced last week), the management of the company determined to restore the former salaries of the employees affected, except the president and vice-presidents.

The New York State Public Service Commission, First district, is preparing to hold next September at Schenectady, N. Y., a series of tests of fenders for use on electric cars running in city streets. The tests will be made at the works of the General Electric Company, and a similar series will be held at the Westinghouse Electric & Manufacturing Company's works at Pittsburgh, Pa. The committee to supervise the tests consists of Messrs. A. W. McLimont, D. L. Turner and G. F. Daggett. In making the tests "dummies" of three different weights will be used to simulate human beings, and with each dummy 10 or more tests will be made.

The Attorney-General of New Hampshire has brought suit in the superior court of Rockingham county against the Boston & Maine, charging it with violating the law in raising freight rates. It is said that the action of the Attorney-General is due to a letter which has been sent to him by R. W. Pillsbury, a candidate for nomination as governor, and that the law referred to is that under which the Boston & Maine several years ago was allowed to merge other railroads with itself. In that law there was a provision that the road must not advance the freight rates in force in 1889. The court has ordered the defendant to make answer September 8.

The railroads between Pittsburgh and Lake Erie have put back to work large numbers of trainmen and shopmen who were discharged last winter, and some lines have reopened telegraph offices which had been closed. At Altoona, Pa., some of the men engaged on outdoor repairs to freight cars are now working 11 hours a day. The Southern Pacific shops at Sacramento were reopened July 6, after being closed about five months. The number of men employed is about 1,000, which is about one-fourth less than the number at work last year. At New Orleans it is announced that the Southern Pacific has ordered a general resumption of work in the shops of the company.

Disastrous Collision at Knobnoster, Mo.

In a butting collision of passenger trains near Knobnoster, Mo., on the Missouri Pacific, on the morning of July 2, about 5 o'clock, five passengers and four trainmen were killed, and 50 or more persons were injured; and both of the engines and four cars were wrecked. An order had been issued requiring the trains to meet at Knobnoster, but a subsequent order was issued changing the meeting point, and it was in consequence of some mistake in arranging the change that the collision occurred.

B. F. Yoakum's Advice to Mr. Bryan.

"The new state of Oklahoma has about 5,000 miles of railroads and needs an additional 4,000 miles to enable its people to economically and properly develop its resources. I could go on citing such cases from the Mississippi river to the Pacific coast. This is the only time for 10 years that I have not been engaged in the construction of from 500 to 1,000 miles of railroad. I have not driven a spike nor contracted for a single mile of railroad construction since last October, and under present conditions would not feel warranted in so doing. If I should feel so inclined I could not find the money.

"I have been constantly urging that the political parties of this country give the country an opportunity to again catch up, to restore confidence to its normal condition and to hold corporations under strict regulation. Labor leaders have talked freely and openly with me. When both tickets are launched they are going to support the party that will give them employment.

"I believe if Mr. Bryan will indorse a constructive policy, one that will say to the American people that the Democratic party, if successful, is going to look the situation squarely in the face, with the foremost intent of restoring confidence in business and finding employment for the millions of job hunters of to-day, the American people, both the business men and the laborers, will give their support to such a doctrine. The fact that he stood for reform of corporate management and against abuses will only add strength to a strong, fair, cleancut statement that he still stands for such reforms. * * * Something on the following lines should be inserted in the Democratic platform:

"'We are in full accord with what has been done toward the enforcement of the Hepburn act, the elimination of the rebate and discrimination between different classes of shippers. We indorse what has been accomplished toward uniformity and publicity in railroad accountings.

"'We view with apprehension the indiscriminate agitation which is threatening the welfare of all interests. * * * The present ceaseless agitation has so shaken the confidence of investors that capital for the improvement of existing railroads and for the construction of new railroads is not forthcoming. We pledge ourselves to a strong constructive policy

on broad lines, which, while it will embrace the rigid enforcement of existing laws and the punishment of all offenders, will have full regard to the fostering development and expansion of our transportation companies through the enactment of a law placing under the supervision of the Interstate Commerce Commission all future issues of stocks and bonds by interstate carriers, that will properly and effectively protect the public from the over-issue of the same. We favor an amendment to the Sherman law that will permit railroads to enter into and publish traffic agreements where it is for the common good of the people and the railroads to do so, but subject in all cases to the approval of the Interstate Commerce Commission.'"—*Letter to Friend in Lincoln.*

Valuation of Railroads in Washington.

The railroad commission appointed by the state of Washington has completed its work of finding the cost of reproducing the three principal railroads of the state, and the present valuation of the property. The findings show the necessary number of acres to be cleared, the number of stations or square rods to be grubbed, and the number of cubic yards of earth, gravel, hardpan, loose and solid rock to be moved and the overhaul connected therewith; the number of ties to be laid; the tonnage of rails, track fastenings, etc.; the number of miles of track laying and surfacing; the square foot area of all standard buildings, roundhouses, shops, etc.; the length of bridges, with figures showing the quantities of metal, timber, concrete, etc., therein; the number of feet of tunnels driven and whether lined or unlined; the dangerous trees cut along the line; the number, kind and dimensions of miscellaneous structures. In short, the findings give every unit quantity of labor and material capable of segregation. By this unit system, the work of future commissions is made easy, in that any particular expenditure may be specialized and placed under its correct heading. The figures are as follows:

Amount Expended in the State to June 30, 1907.

Northern Pacific	$83,382,722
Great Northern	43,669,113
Oregon Railroad & Navigation	14,244,242

Cost of Reproduction of Property Used for Railroad Purposes.

Northern Pacific	$109,959,459
Great Northern	58,465,431
Oregon Railroad & Navigation	15,676,252

Cost of Reproduction of Commercial, Dock and Warehouse Property.

Northern Pacific	$15,189,248
Great Northern	9,896,472
Oregon Railroad & Navigation	550,000

Market Value of Railroad Property, not Including Commercial, Dock and Warehouse Property.

Northern Pacific	$111,000,000
Great Northern	59,000,000
Oregon Railroad & Navigation	16,500,000

The effect of the findings, if they stand, will be that the commercial, dock and warehouse property will be listed and assessed not as railroad property but as commercial property. The railroads will be given an opportunity to examine the findings and present argument, if they desire, on the correctness of the findings, or on the necessity of additional findings. As soon as this is done, expert evidence showing the value of the use of the property will be introduced and findings made on that branch of the case. This should be accomplished by August 1.

National Congress of Refrigerating Industries.

Prominent refrigerating engineers and men engaged in that business in France, America and other countries, propose to hold a congress in Paris, France, October 5 to 10; and J. F. Nickerson, Secretary of the American Committee, 315 Dearborn street, Chicago, has issued a circular giving a list of subjects to be discussed. The application of refrigeration in commerce and transportation is the subject of Section 5, and the authors or men in charge of the several topics are given as follows: Progress of trade in perishable produce since the adoption of refrigeration; general statistics; M. D. Perouse, Hon. Director of Railroads, Director of the Chargeurs Reunis Co. Organization of cold storage transport on railroads; refrigerator cars, cold storage warehouses and charges; M. G. de Pellerin de Latouche, Director of the Paris, Lyons & Mediterranean. Organization of cold storage transport by sea; M. J. Dal Piaz, Secretary General of the Compagnie Generale Transatlantique. The President of the French General Committee is Andre Lebon, ex-Minister of Commerce; the President of the American Committe is Homer McDaniel, Cleveland, Ohio; Vice-President, John E. Starr, 258 Broadway, New York. The railroad and steamship committee of the American Committee consists of J. C. Stubbs, of the Southern Pacific; J. S. Leeds, of the Santa Fe Refrigerator Despatch, and E. F. McPike, of the Illinois Central.

Co-operation Between Officers and Employees on the Alton-Clover Leaf.

P. H. Houlahan, General Manager of the Chicago & Alton and the Toledo, St. Louis & Western, is going to have meetings of officers and employees at division points on the second and fourth Mondays of each month. The purpose is to bring the employees and officers into closer personal contact. Both officers and employees are asked to suggest matters for discussion, and at the meetings thus far held the invitation has been generally accepted.

Mr. Houlahan's circular to the officers and employees says:

"To assist the company which employs you in maintaining your present rate of pay and successfully continuing its business, your co-operation is solicited, so far as consistent with law and honor, in increasing passenger travel and freight shipments. Good results can be accomplished by making proper effort with your acquaintances, merchants with whom you deal and through people of general influence."

Considered in the Light of a Joke.

"There is something funny to us old railroad men who have gone through the horrors of 1893 and 1907-8, to see the fellows that are losing $13,000,000 a year running the post-office voluntarily assuming the job of showing us how to run the railroads."—*Philadelphia News Bureau.*

Southern Pacific Bulletins.

SURPRISE TESTS.

February 6, Road Foreman of Engines, riding on engine of train ..... between ..... and ....., placed engineer's valve on lap and whistled brakes three times at intervals of 30 seconds. Air was applied from train by use of conductor's valve, and train stopped at first blast of whistle.

March 13, 3.09 p.m., at ....., extra 2,514, Engineer ....., met extra 2,554, Engineer ..... Indicator on caboose changed to read "Extra 2,545." Engineer failed to notice mistake and was disciplined.

April 22, 10.50 p.m., one mile east of ....., No. 5, Conductor ....., Engineer ....., exploded one torpedo. Signal answered and train brought to a stop, but flagman was not whistled out in accordance with rules, nor recalled. Engineer disciplined.

April 23, 12.50 a.m., 1½ miles east of ....., No. ....., Conductor ....., Engineer ....., approached red fusee. Engineer applied air and reduced speed, but did not come to full stop, as required by rules, nor answer signal, and no flagman whistled out or recalled. Engineer disciplined.

May 12, block signal at danger at west end of ..... yard for extra 1,900, Engineer ..... Engineer passed signal without stopping, and explained that electric headlight showed switch to be all right and the track ahead clear. Engineer disciplined.

May 11, train No. 3 had markers removed when meeting No. 24, engine ....., Conductor ....., Engineer ..... at ..... at 4.03 p.m. Absence of markers not observed by conductor and engineer of train No. 24. Both disciplined.

COMMENDATORY BULLETINS.

April 17, 12.17 a.m., No. ....., engine ....., Conductor ....., Engineer ....., when passing fire among some bridge material observed same burning close to frame bent of bridge No. 363, three miles east of ..... Train stopped and fire extinguished. Record of engineer credited with ..... merit marks for vigilance.

May 27, 11.55 p.m., east end of yard at ....., brakeman ..... of train No. 55 on passing track awaiting arrival of westbound passenger train, observed cars shoved foul of main track by switching crew working in opposite end of yard. He immediately ran out and stopped approaching passenger train, the engineer of same being unable to see dangerous position of cars account curve. Brakeman suitably rewarded for his prompt action, which doubtless prevented a collision.

ACCIDENT BULLETINS.

February 10: The undersigned, comprising Board inquiring into cause of rear collision between trains .... and .... at ..... February ...., are of unanimous opinion that Conductor ..... was responsible for not sending flagman out promptly when train stopped on a grade at a known dangerous place, and that Engineer ..... and Conductor ..... of train .... were likewise responsible for approaching station where view was obscured without having train under proper control, in direct violation of Rule .....

Signed.....Division Superintendent.
.....Master Mechanic.
.....Trainmaster.
.....Division Engineer.
.....Traveling Engineer.
.....Merchant.

February 11: The undersigned, constituting regular Board inquiring into cause of derailment of train No. 3 just west of ..... on February ...., find the cause due to a broken rail, there being no apparent reason for the breaking of the rail, which evidently occurred after engine, mail and baggage car had passed over the point of break.

Signed.....Chief Engineer.
.....General Superintendent.
.....Superintendent.
.....District Engineer.
.....Roadmaster.
.....Mayor.
.....Pres. First National Bank.
.....Agrl. Implements, etc.

March 5: We, a committee invited to investigate cause of derailment of engine .... on train .... near ....., March ...., 1908, after a careful examination, are of the opinion that wreck was caused by excessive speed on 10-deg. curve, in direct violation of special time table rule No. .... No defects found in condition of track or equipment.

Signed.....Lumberman.
.....Cashier National Bank.
.....Editor.
.....Superintendent.
.....Division Engineer.
.....Division Master Mechanic.

Traffic News.

The railroad commission of South Dakota announces that, after repeated urging by the board, the Chicago, Milwaukee & St. Paul has made large reductions in freight rates on its Pacific coast extension west of Mobridge.

The Coal & Coke Railway of West Virginia has asked the Circuit Court of the state for an injunction to prevent the officers of the state from enforcing the two-cent fare law passed by the last legislature. The law has been in effect on the Coal & Coke for over a year and the officers of the company declare that it is confiscatory.

It is announced that the $10 passenger rate between Chicago and New York, which was first applied by the Erie, and has since been made by the Grand Trunk, the New York, Chicago & St. Louis and the Wabash, will be discontinued September 1, and that thenceforth the former second-class differential rate of $16 will be the lowest rate available.

Gen. George F. Randolph, First Vice-President of the Baltimore & Ohio, has been elected Chairman of the Trunk Line Executive Committee. He has been temporarily acting in this capacity since the death of the former Chairman, Nathan Guilford, who was Vice-President in charge of traffic of the New York Central Lines East of Buffalo.

The State Corporation Commission of Oklahoma has addressed letters to the railroad commissions of Kansas and Missouri asking that a meeting of state commissions be arranged to be held soon and to be participated in by the commissions of Kansas, Missouri, Oklahoma, Texas and Arkansas, for the purpose of taking steps to have interstate rates reduced in these states.

The Interstate Commerce Commission has authorized the extension till October 1 of tariffs containing long and short haul clauses, maximum rules, alternative rate of fare provisions and other irregularities which, the Commission has decided, cannot be permanently permitted. No change other than the extension of time is authorized in the terms of the tariff circular issued last January. The Commission also announces that it will not grant any further extension of time in this manner either by general order or in individual cases, but that from and after October 1 it will adopt such means as may be necessary to deal with unlawful use of tariffs.

The Montreal Board of Trade has established a Transportation Bureau and will engage an expert in freight matters whose duty will be to facilitate adjustments of claims for overcharges, delays, loss or damage, demurrage and complaints of classifications, and to generally advise members as to their rights, and to keep in touch with all matters which have any connection with the traffic of the port.

The Missouri Pacific has applied to the Nebraska State Railroad Commission for authority to advance its passenger rates from 2 cents a mile to 3 cents and to advance its freight rates 15 per cent. This company reduced its passenger rates to 2 cents a mile and its freight rates 15 per cent. in accordance with laws passed by the state legislature in 1907. It alleges that it is suffering heavy losses under these rates.

The Comptroller of the state of New York proposes to prosecute certain persons in New York City engaged in the sale of steamship tickets and receiving money on deposit or for transmission to foreign countries because of their failure to file with the Comptroller a $15,000 bond, as required by a law recently enacted. The new law is designed to protect against fraud immigrants desiring to send funds to relatives or others in their native countries.

All testimony taken in the various suits brought by the railroads to test the constitutionality of the maximum freight rate law and the 2-cent passenger laws of Missouri will be submitted to Judge Smith McPherson, of the federal court at Kansas City, on October 5. The original intention was to have a three months' test of the effect of the 2-cent passenger fare law made in Missouri, but the law had been in effect one year on July 4 last. Consequently, the test will cover a period of 15 months.

Judge Pollock in the Federal Court has appointed Judge Z. T. Hazen, of Topeka, Kan., to take testimony in the suit brought by the Leavenworth & Topeka Railroad to enjoin the Kansas Board of Railroad Commissioners from enforcing the order issued by it on October 31, 1907, prescribing a new tariff of freight rates, making a 25 per cent. reduction. The Leavenworth & Topeka is owned jointly by the Atchison, Topeka & Santa Fe and the Union Pacific. This suit marks the actual beginning of the contest to prevent the application of the proposed reduced freight rates. Under a temporary injunction issued last year the old rates are still in force.

The Interstate Commerce Commission has received from the southern railroads freight tariffs, going into effect August 1, showing reductions of 2, 3 and 4 cents per 100 lbs. in grain, flour and provisions to and from many points, and an increase of 2 cents per 100 lbs. on sugar and coffee from the seaboard to Chicago and other western points. The tariffs come from the Southern, the Illinois Central, the Louisville & Nashville, the Mobile & Ohio and the Nashville, Chattanooga & St. Louis and their connections, being filed by M. P. Washburn, chairman of the Southeastern & Mississippi Valley Association, and A. D. Hall, chairman of the Southern Freight Association.

The question of absorbing the local charges on freight carried in the Chicago Tunnel has not been settled by the roads running east from Chicago, but now the Erie has made another move. It has filed with the Interstate Commerce Commission a tariff in which, on all L. C. L. shipments from Chicago, it will make the Chicago rate from north and west side *public* stations of the Illinois Tunnel Company; in other words, it will absorb the tunnel charges on shipments made from the stations named. This is not taking the goods at the "store door," as the shippers will have to use wagons to carry their goods to the public tunnel stations. The action of the Erie is the same as that taken several weeks ago by the Wabash, and then rescinded. (*Railroad Age Gazette*, June 12, p. 88.)

The Pennsylvania Railroad has declined to put shelves in the freight cars which are to be used this year in carrying peaches from Delaware to northern cities because it has been an unbearable expense; and a circular has been issued giving the reasons why this decision has been made. The shippers

were notified last year that the shelving heretofore provided would be discontinued, but the reasons are now again stated. First, the company cannot shelve cars for all of its peach shippers, and to do so for a part of them would be unlawful discrimination. Secondly, it is necessary to prepare from 1,000 to 1,500 cars for the Delaware peninsula alone, and this takes the cars out of service for 20 days or more. Last year this was done while at the same time the cars were much needed for other merchandise. Two years ago the company went to large expense to fit the cars, and then the entire peach crop was ruined by rainy weather; and the cars had to be sent back to the shops without having been used. Shelved cars have to be returned empty, making sometimes an unnecessary delay. Preparing themselves to use these cars, shippers are not prepared to use other available cars. The company last year reduced the minimum carload to 15,000 lbs., thus making a substantial reduction in the freight rate on many shipments.

The New York grain shippers seem to have difficulty in agreeing with the railroads on the question of the modification of the present rates with a view to the prevention of the decline of the New York export trade in competition with Montreal, but it does not appear that any change is likely to be made in the rates. The shippers say that practically no grain is being shipped from New York, owing to the severe competition encountered from Montreal, which port appears to be absorbing the traffic of grain shipments from the lake territory. They believe that if the railroads would reduce the export rate on grain east from Buffalo from 5½ to 4 cents a bushel this traffic could be diverted from Montreal. C. C. McCain, of the Trunk Line Association, says, however, that no reduction is contemplated. There has been no intention of discourtesy on the part of the railroads toward the shippers. The Trunk Line Association has carefully considered the complaint of the shippers and fully canvassed the situation through their representatives east and west of Buffalo. These had reported that any change in the rates from Buffalo or Lake Erie ports would be inadvisable, and the lines had accordingly come to the conclusion that they could not comply with the suggestions of the committee of the Produce Exchange. The proposed change in the rates would not result in any increased grain movement by way of New York. The Montreal route is independent, and if the New York lines reduced rates they would answer probably by making fresh reductions and the competition would become more severe.

INTERSTATE COMMERCE COMMISSION.

Allowance for Car-Door Boards Must be Filed.

Victor Fuel Co. v. Atchison, Topeka & Santa Fe. Opinion by Chairman Knapp.

Complainant is a Colorado corporation engaged in mining, selling and shipping coal. It has been the practice of the defendant to furnish complainant and others engaged in similar business box and stock cars for the shipment of coal. To protect the ordinary car doors, false doors, known as car-door boards, have been placed across the side doors of the cars. Prior to October 29, 1907, defendant's tariffs provided that 25 cents per car would be paid to coal shippers in the Rocky Mountain region when car-door boards were furnished by them. In August, 1907, defendant's general manager increased this to 50 cents per car, and agreed as to complainant that the increased allowance should date back to July 1, 1907. The tariff was filed and became effective October 29, 1907. The defendant's legal department notified the complainant that the 50-cent allowance could not be paid for shipments made previous to the time the new tariffs became effective. This is correct, the commission believes, since the allowance cannot be paid unless it is on file in defendant's tariffs.

Through Rates Must Not be Higher Than Combination of Locals.

Oshkosh Logging Tool Co. et al. v. Chicago & North-Western et al; Termatt & Monahan Co. et al. v. Wisconsin Central et al.; Oshkosh Logging Tool Co. et al. v. Chicago, Milwaukee & St. Paul et al. Opinion by Chairman Knapp.

It is alleged that the defendants' through rates from points in the Central Freight Association territory to Oshkosh, Wis., Neenah, Fond du Lac and Appleton are unreasonable because they exceed the combination of locals from Central Freight Association territory to these points. In December, 1906, the commission issued the following ruling: When a joint rate is in effect by a given route which is higher between any points than the sum of the local between the same points by the same or another route, the joint rate may be reduced to the sum of the locals upon giving the commission notice of such reduction. Since this ruling many of the railroads have lined up their rates as suggested, but others have raised the local rates so that their sum would equal the through joint rate. The commission holds that the through rate being higher than the combination of local rates in these cases is unreasonable and unjust. No order will be made at this time, as it is believed the carriers will readjust their rates.

Voluntary Reduction of a Rate Does Not Prove Former Rate Unreasonable.

Ottumwa Bridge Co. v. Chicago, Rock Island & Pacific. Opinion by Commissioner Clark.

Complainant is engaged in the manufacture and sale of structural iron and steel at Ottumwa, Ia. On July 15 and 23, August 7 and 10, respectively, it shipped four carloads of structural iron and steel over the Chicago, Rock Island & Pacific from Ottumwa to Kansas City, Mo. On the dates of the shipments the rate was 22 cents per 100 lbs. in carloads. On August 10, 1907, the Chicago, Burlington & Quincy established a rate on structural iron of 16 cents per 100 lbs. in carloads from Ottumwa to Kansas City, and on August 14, 1907, the Chicago, Rock Island & Pacific established the same rate. The structural iron in question was shipped under contract of sale made prior to shipment, and the complainant knew the rate then in force between Ottumwa and Kansas City, and took this rate into consideration in determining its bid. The real question, therefore, is whether or not the 22-cent rate was, under the circumstances, unjust and unreasonable. Ottumwa is directly intermediate between Des Moines, Ia., and Kansas City, on the line of the defendants; but at the time of the shipments the defendant did not have lower rates on structural iron from Des Moines, Ia., to Kansas City than from Ottumwa. There is no evidence to show that the rate at that time was unreasonable, and the commission does not favor the theory that the voluntary reduction of a rate by a carrier conclusively shows that the former rate was unjust and unreasonable, and that reparation should be granted on all shipments moving thereunder within the period of the statute of limitations. The complaints are therefore dismissed.

STATE COMMISSIONS.

Indiana. Division of Rates Between Carriers.

Cleveland, Cincinnati, Chicago & St. Louis v. Southern Indiana. Opinion by Commissioner Wood.

Coal from the Linton district on the Southern Indiana via the C., C., C. & St. L. to Indianapolis and to towns situated in what is known as the "Gas Belt Territory" is charged 50c. a ton. The complaint asks for a division of this rate between the C., C., C. & St. L. and the Southern Indiana, but no evidence of the cost of service and transportatian was submitted. Generally, percentage joint rates are constructed on a mileage basis, except where either the originating or delivering line carries a very short distanee, say five or 10 miles in an aggregate haul of 100 miles or more, or where the originating line is allowed a bonus. No bonus is allowed, however, where the delivering line is in a position to exchange attractive tonnage in return, or where it can furnish all the business required from its own territory.

Applying these rules, the complainant would receive 65 per cent. of the Indianapolis rate and the defendant 35 per cent. As the complainant has heretofore received 60 per cent. of the joint rate and the defendant 40 per cent., the commission will not order this division changed.

REPORT OF EARNINGS AND EXPENSES OF RAILROADS.

MONTH OF MAY, 1908.

(See also issue of July 3, page 449.)

Name of road.	Mileage operated at end of period.	Operating revenues: Revenue, Freight.	Revenue, Passenger.	All other revenue from transportation.	Revenue, operations other than transportation.	Total operat'g revenues.	Operating expenses: Maintenance Way and structures.	Maintenance Of equipment.	Expenses Traffic.	Expenses Transportation.	Expenses General.	Total operating expenses.	Net operating revenues (or deficit).	Taxes.	Operating income (or loss).
Atchison, Topeka & Santa Fe	7,102	$3,832,859	$1,408,365	$384,657	$45,302	$5,671,183	$725,443	$783,526	$120,834	$1,604,177	$115,149	$3,349,129	$2,322,054	$355,240	$1,966,814
Atlantic Coast Line	4,368	1,325,371	437,044	168,428	19,495	1,950,338	282,349	288,557	33,726	751,022	47,711	1,403,365	546,973	98,339	448,634
Baltimore & Ohio	4,006	3,732,342	1,019,526	301,617	39,008	5,092,493	849,979	893,467	136,873	2,039,536	94,189	4,014,044	1,078,449	164,150	914,299
Boston & Maine	2,242	1,670,030	1,002,896	190,897	44,848	2,908,671	320,783	363,888	39,927	1,324,737	51,494	2,100,829	807,842	137,729	670,113
Central of Georgia	1,913	429,959	210,396	55,091	23,595	719,041	112,242	151,234	25,524	282,409	28,669	600,078	118,963	38,675	80,288
Central R.R. of New Jersey	667	1,550,088	370,105	3,573	22,872	1,946,638	228,496	287,064	26,040	491,921	32,251	1,065,772	880,866	187,480	693,386
Chesapeake & Ohio	1,839	1,400,933	327,116	79,981	9,599	1,817,629	226,957	361,024	34,695	525,995	32,221	1,180,892	636,737	67,820	568,917
Chicago & Alton	1,005	491,860	274,921	81,178	3,969	851,928	69,957	73,473	37,631	288,383	24,859	494,303	357,625	30,000	327,625
Chicago & Eastern Illinois	957	482,497	124,695	32,500	3,006	642,698	83,345	82,964	12,960	257,770	33,080	470,119	172,579	30,196	142,383
Chicago, Burlington & Quincy	9,022	3,640,744	1,393,954	481,130	51,764	5,567,591	1,637,302	907,814	112,907	1,912,222	147,980	4,718,225	849,366	201,100	648,266
Chicago, Lake Shore & Eastern	580	297.378	.....	19,770	6,424	323,572	38,210	77,762	944	107,121	4,492	228,529	95,043	3,000	92,043
Chicago, Rock Island & Pacific	7,402	2,347,414	1,168,183	265,935	19,773	3,801,305	587,617	442,279	105,228	1,620,393	104,570	2,860,087	941,218	154,931	786,287
Colorado & Southern	1,248	421,061	119,528	33,621	3,253	577,463	78,328	113,619	14,786	205,570	27,721	440,024	137,439	20,090	117,349
Delaware, Lackawanna & Western	893	2,255,727	519,336	170,565	9,733	2,955,361	426,915	397,443	57,013	763,315	51,785	1,696,471	1,258,890	112,800	1,146,090
Denver & Rio Grande	2,501	1,037,454	362,692	65,390	5,354	1,470,890	157,639	226,166	36,764	474,499	42,506	937,574	533,316	61,000	472,316
El Paso & Southwestern	865	385,926	88,271	19,196	3,280	496,674	68,212	97,452	9,391	152,009	17,606	344,670	152,004	12,828	139,176
Erie	1,899	2,371,076	670,319	213,160	20,590	3,275,145	290,052	645,860	74,202	1,184,656	71,632	2,266,402	1,008,742	1,012†	1,009,754
Great Northern	6,663	2,554,558	857,306	217,662	12,635	3,642,161	1,075,433	485,398	55,298	1,118,170	76,619	2,810,918	831,243	141,764	689,479
Gulf, Colorado & Santa Fe	1,515	447,776	167,900	44,518	4,948	665,142	113,944	142,181	20,264	361,839	22,810	661,038	4,104	46,939	‡42,835
Lake Shore & Michigan Southern	1,508	1,822,949	666,166	386,287	18,899	2,894,301	416,866	391,923	74,860	1,116,803	55,611	2,056,063	838,238	110,001	728,237
Louisville & Nashville	4,348	2,247,776	785,360	206,429	20,107	3,259,672	459,650	655,877	82,937	1,181,087	81,940	2,461,491	798,181	129,150	669,031
Michigan Central	1,746	1,234,501	440,493	164,177	11,221	1,850,392	203,471	231,616	56,087	788,565	33,504	1,313,243	537,149	90,000	447,149
Missouri, Kansas & Texas	3,072	920,566	433,719	85,341	45,730	1,485,356	239,652	230,885	46,676	677,218	54,437	1,248,868	236,488	66,494	169,994
New York, Chicago & St. Louis	553	596,013	97,081	21,784	2,467	717,345	67,292	100,646	45,042	283,447	12,247	508,674	208,671	23,000	185,671
New York, New Haven & Hartford	2,006	2,004,519	1,766,743	284,595	76,706	4,132,563	699,909	448,756	21,190	2,034,910	102,656	3,307,421	825,142	260,000	565,142
Norfolk & Western	1,877	1,672,332	259,535	70,920	5,410	2,008,197	217,742	262,873	38,332	646,420	55,008	1,220,375	787,822	87,600	700,222
Pennsylvania Company	1,414	2,123,960	519,719	272,598	15,420	2,931,697	258,140	406,492	57,890	1,053,431	69,143	1,845,096	1,086,601	132,060	954,541
Pennsylvania R.R. Co.	3,978	7,413,840	2,319,614	1,007,192	69,543	10,810,189	1,206,700	1,745,994	144,212	4,083,418	267,529	7,483,828*	3,326,361	174,339	3,152,022
Philadelphia, Balt., & Washington	715	652,649	556,237	152,269	6,273	1,367,428	184,805	197,436	21,494	594,115	26,590	1,024,440	342,988	31,142	311,846
Pittsburgh, Cin., Chic. & St. Louis	1,472	1,566,612	548,171	261,810	11,286	2,387,878	255,281	381,018	52,653	879,464	66,138	1,634,554	753,324	103,250	650,074
St. Louis & San Francisco	4,727	1,442,798	609,000	186,905	16,723	2,255,426	295,384	261,508	64,092	932,737	78,554	1,632,275	623,151	91,547	531,604
Southern Ry.	7,501	2,258,651	996,143	355,424	17,320	3,627,538	416,262	459,116	97,164	1,498,004	112,642	2,583,188	1,044,350	163,805	880,545
Vandalia	829	366,964	167,053	78,499	2,544	615,060	94.204	99,799	20,834	257,900	16,699	489,436	125,624	22,605	103.019
Wisconsin Central	1,023	369,473	117,702	30,799	2,844	520,818	86,344	82,818	22,436	211,919	16,715	420,232	100,586	24,568	76,018
ELEVEN MONTHS OF FISCAL YEAR, 1908.															
Atlantic Coast Line	4,368	$16,421,564	$5,874,950	$1,530,733	$272,839	$24,100,086	$3,519,034	$3,893,404	$398,067	$9,200,228	$592,789	$17,603,522	$6,496,564	$972,679	$5,523,885
Atchison, Topeka & Santa Fe	7,102	47,829,967	16,432,968	5,220,684	684,891	70,168,510	10,561,015	11,533,644	1,372,659	20,640,129	1,190,400	45,297,847	24,870,663	2,447,718	22,422,945
Baltimore & Ohio	4,006	51,596,466	12,695,969	3,362,279	517,815	68,172,529	10,000,657	11,859,190	1,532,103	25,727,667	1,144,396	50,264,013	17,908,516	1,809,130	16,099,386
Boston & Maine	2,242	20,756,025	12,407,702	2,118,222	663,197	35,945,146	4,375,290	4,411,863	457,312	17,169,867	631,483	27,045,815	8,899,331	1,566,137	7,333,194
Central of Georgia	1,913	7,031,879	2,639,388	645,408	254,537	10,571,212	1,425,722	1,962,817	282,961	3,884,703	327,095	7,883,298	2,687,914	407,231	2,280,683
Central R.R. of New Jersey	667	16,163,631	4,316,584	38,564	360,992	20,879,771	2,208,743	3,389,846	294,910	5,879,815	365,413	12,138,727	8,741,044	1,178,194	7,562,850
Chesapeake & Ohio	1,839	18,105,138	4,752,326	938,344	124,040	23,919,848	2,735,441	5,000,838	430,531	7,263,261	398,966	15,829,037	8,090,811	746,020	7,344,791
Chicago & Alton	1,005	7,108,293	3,208,339	758,482	56,602	11,131,716	1,294,923	1,450,435	444,820	3,580,754	288,371	7,059,303	4,072,413	330,000	3,742,413
Chicago & Eastern Illinois	957	7,929,051	1,549,585	447,401	48,955	9,974,992	1,140,228	1,618,490	184,249	3,644,007	335,733	6,922,707	3,052,285	308,587	2,743,698
Chicago, Burlington & Quincy	9,022	48,952,221	17,070,591	5,375,718	606,277	72,004,807	12,774,364	11,517,985	1,408,905	23,304,736	1,625,688	50,631,678	21,373,129	2,212,100	19,161,029
Chicago, Lake Shore & Eastern	580	3,616,145	.....	314,127	90,342	4,020,614	358,960	1,060,687	12,715	1,263,084	54,083	2,749,529	1,271,085	41,821	1,229,264
Chicago, Rock Island & Pacific	7,402	33,017,398	14,456,621	2,842,412	325,015	50,641,446	7,067,448	7,057,974	1,285,993	20,522,026	1,161,541	37,094,982	13,546,464	1,547,364	11,999,100
Colorado & Southern	1,248	5,973,235	1,475,070	381,927	43,127	7,873,359	1,048,660	1,349,518	157,185	2,572,166	267,272	5,394,801	2,478,558	218,228	2,260,330
Delaware, Lackawanna & Western	893	23,001,666	6,049,227	1,725,457	144,010	30,920,360	3,210,935	4,771,715	522,171	8,967,478	564,642	18,036,941	12,883,419	1,177,500	11,705,919
Denver & Rio Grande	2,501	13,267,815	4,700,756	743,613	81,949	18,794,133	2,051,563	2,967,849	411,031	6,256,265	439,516	12,126,224	6,667,909	686,000	5,981,909
El Paso & Southwestern	865	5,732,590	1,019,088	236,161	46,836	7,034,675	831,960	1,385,791	88,100	2,441,693	186,768	4,934,312	2,100,363	102,854	1,997,509
Erie	1,899	28,277,807	7,939,941	2,426,782	237,586	38,882,116	4,724,923	8,616,636	855,790	14,617,037	765,568	29,579,954	9,302,162	942,771	8,359,391
Great Northern	6,663	37,857,068	10,265,092	2,430,357	182,789	50,735,306	8,701,021	7,471,644	679,988	15,614,965	686,715	33,154,333	17,580,973	2,126,557	15,454,416
Gulf, Colorado & Santa Fe	1,515	7,409,543	2,385,836	542,094	72,375	10,409,848	1,674,614	1,966,758	231,472	4,765,213	284,446	8,922,503	1,487,345	343,420	1,143,925
Lake Shore & Michigan Southern	1,508	24,937,254	8,406,423	4,100,625	228,691	37,672,993	5,286,019	4,700,004	964,597	13,192,030	634,857	24,777,507	12,895,486	1,253,329	11,641,957
Louisville & Nashville	4,348	28,992,201	9,754,690	2,205,055	242,683	41,194,629	5,468,156	8,815,453	965,317	15,008,510	949,300	31,206,736	9,987,893	1,315,932	8,671,961
Michigan Central	1,746	15,841,053	5,682,996	2,043,128	165,635	23,732,812	2,865,570	2,994,142	711,850	9,574,310	397,292	16,543,164	7,189,648	968,775	6,220,873
Missouri, Kansas & Texas	3,072	14,221,171	5,914,576	1,134,118	283,690	21,553,555	2,782,967	2,852,775	554,326	8,196,627	584,618	14,971,313	6,582,242	622,569	5,959,673
New York, Chicago & St. Louis	553	7,345,565	1,379,546	287,805	28,256	9,041,172	707,619	1,097,657	482,541	3,649,889	139,023	6,076,729	2,964,443	280,579	2,683,864
New York, New Haven & Hartford	2,006	23,172,000	21,173,382	3,179,431	1,168,067	48,692,880	5,178,003	7,042,268	278,069	21,609,017	1,242,352	35,349,709	13,343,171	2,952,000	10,391,171
Norfolk & Western	1,877	22,187,145	3,707,363	830,002	86,470	26,810,980	3,201,818	4,386,768	434,317	8,707,163	548,232	17,278,298	9,532,682	933,200	8,599,482
Pennsylvania Company	1,414	30,061,319	6,478,743	3,027,066	284,100	39,851,228	4,557,739	6,974,888	688,761	14,682,206	805,244	27,708,838	12,142,390	1,483,561	10,658,829
Pennsylvania R.R. Co.	3,978	97,821,442	28,051,912	11,315,310	1,190,114	138,378,778	16,530,586	26,042,090	1,789,667	52,632,552	3,094,007	100,564,367§	37,814,411	1,917,732	35,896,679
Philadelphia, Balt., & Washington	715	7,114,399	6,626,591	1,543,625	104,272	15,388,887	1,953,520	2,607,792	254,917	6,716,999	307,706	11,840,935	3,547,952	342,560	3,205,392
Pittsburgh, Cin., Chic. & St. Louis	1,472	21,094,859	6,622,782	3,156,294	179,326	31,053,261	3,880,186	5,714,550	682,042	11,285,303	629,591	22,191,672	8,861,589	1,159,608	7,701,981
St. Louis & San Francisco	4,727	21,132,873	7,904,386	2,348,097	201,208	31,586,564	4,097,461	4,383,546	720,155	11,861,390	916,388	21,978,940	9,607,624	797,871	8,809,753
Southern Ry.	7,501	31,660,508	13,228,135	3,802,305	278,107	48,969,055	6,671,370	8,601,455	1,193,573	19,167,042	1,417,707	37,051,147	11,917,908	1,858,428	10,059,480
Vandalia	829	5,491,776	2,082,779	860.126	43,650	8,478,331	1,108,923	1,579,802	241,624	3,351,325	193,695	6,475,369	2,002,962	241,730	1,761,232
Wisconsin Central	1,023	4,928,805	1,404,533	383,879	29,096	6,746,313	744,298	971,119	231,838	2,570,716	207,774	4,725,745	2,020,568	295,014	1,725,554

*Includes canal expenses, $35,975.
†Tax adjustment.
‡Loss.
§ Includes $475,465 canal expenses.

Wisconsin. Interveners' Objection to Building Spur Track Not Acceptable as Evidence.

Jefferson Ice Co. v. Chicago & North-Western.

The Jefferson Ice Co. owns an ice house bordering on the Buttons bay, Lake Geneva, which has a capacity of 30,000 tons and is at present filled with ice. The petition asks an order compelling the Chicago & North-Western to build a spur track from its main line to the ice house, a distance of less than two miles. There is a law which compels railroads to build a spur track to any industry when the spur track does not need to be over two miles in length and if the spur track is indispensable to carrying on the business of the industry and if the industry cannot find outlet for its products in any other way. If, however, the spur track when built to the best of the ability of the railroad is unusually unsafe and dangerous, or if the industry desiring the track cannot satisfactorily guarantee the payment for the work of constructing the track, the railroad company is not compelled to build such a spur track. In this case a number of people living near the ice house at Lake Geneva, and the people of a little town through which the spur would run, intervened, asking the commission not to compel the building of this spur track, urging various reasons. If the Chicago & North-Western had asked authority to build the spur track, the commission could properly have listened to the petition of property holders and the town through which the spur track is to run. But as this is a case where the Jefferson Ice Co. makes the petition in accordance with the law of the state, it is not proper for the commission to give any hearing or consideration to the petition of any other parties than the Chicago & North-Western. The contention of the Chicago & North-Western that building a spur track from its main line is unusually dangerous because fast passenger trains run over this main line is not sustained by the commission, since they find that it is common practice to build spur lines and switches connecting with the main track where fast passenger trains are run on other points of the Chicago & North-Western and other railroads at other places. It seems that, according to the law, it was necessary for the Jefferson Ice Co. to build its plant before it could petition the commission to order a spur track built. The commission questions the wisdom of this interpretation of the law, suggesting that it might be modified so as to permit an industry intending to locate its plant less than two miles from the line of a railroad, to give a bond guaranteeing its good faith, and then obtain an order compelling a railroad to build a spur track to its property. It is not meant to be implied that it would have made any difference in this case whether the law had been modified as suggested or not. Two miles in length is held to mean length of line, not including side tracks, switches and so on. The commission finds that the petitioner is perfectly able to pay the cost of building such a spur track as it asks for, and that the spur track is absolutely essential to the conduct of its business. Therefore the Chicago & North-Western is ordered to build the spur track.

Texas Railroad Earnings.

The Texas Railroad Commission, which appears to have had considerable internal disagreement on the subject, has issued the following comparison of the receipts and expenses of the railroads of the state for the 10 months ending April 30, 1908, as compared with the same period of the previous fiscal year:

	1907.	1908.
Passenger train earnings	$20,659,956	$21,113,050
Net increase, $453,094, or 2.19 per cent.		
Freight earnings	55,281,457	48,679,123
Net decrease, $6,602,334, or 11.94 per cent.		
Other earnings	3,905,803	263,546
Net decrease, $3,642,257, or 93.25 per cent.		
Gross earnings	79,847,217	70,055,720
Net decrease, $9,791,497, or 12.26 per cent.		
Operating expenses	56,997,952	57,668,962
Net increase, $671,009, or 1.17 per cent.		
Income from operation	22,849,264	12,386,757
Net decrease, $10,462,506, or 45.78 per cent.		

This statement was accompanied by an explanation in which it is sought to demonstrate that the unfavorable showing made was largely due to changes in methods of bookkeeping, and that on the basis of the methods of accounting formerly used, the decline in gross earnings would have been 7.70 per cent. instead of 12.26 per cent., the increase in operating expenses 9.31 per cent. instead of 1.17 per cent., and the decrease in income from operation 50.14 per cent. instead of 45.78 per cent.

Simplifying Freight Office Work.

Typewriting machines for way-billing are time savers. Way-bills are made more rapidly than by hand, and imperfect work of the copying press eliminated. The bills can be used as soon as completed, and less errors are made because the process is more mechanical and less mental. Accounting is much easier and faster on account of the better copy to work from. Way-bills being printed helps in checking the unloading of way freight without delay.

Freight bills should be made on the machine. They are used by consignees for checking and filed as vouchers for money paid out for freight charged; as such, should be neat, perfectly legible and in good convenient business form. A third copy is readily made on the machine and may be used as freight received record, thus eliminating the old form of freight received book and dispensing with the clerks employed in writing up that book.

The comptometer is profitably used in calculation principally, in computing freight charges on way-bills, revising way-bills of inward freight, footing abstracts, cash books, etc. The work is done with cheap help and more accurately and rapidly than when done with pen and pencil. There are at least two freight offices in Minneapolis where one girl at $45 a month multiplies and extends an average of 3,150 items per day in addition to footing many columns of figures and does not make an average of one error a week either in multiplying or footing.

Numbering machines used for placing progressive numbers on way-bills, etc., are time savers and avoid duplication or omission of numbers.

Identification stamps in place of the old method of using chalk give date of unloading and car number from which unloaded. This insures the delivery of proper packages to compare with freight bills; especially valuable in cases of disputed delivery.—*E. F. Glenny, Minneapolis.*

Western Classification Committee.

The semi-annual meeting of the Western Classification Committee will be held at Manitou, Colo., on July 21, and the docket contains 493 subjects. A special train for the convenience of those attending the meeting will be run from Chicago to Manitou over the Chicago & North-Western, the Union Pacific, the Colorado & Southern and the Colorado Midland, leaving Chicago at 10.30 a. m. on July 20.

Among the most important subjects to be considered is that of minimum carload weights. A proposition has been made to make the minimum weight on freight rated third class or higher 24,000 lbs. and on freight rated lower than third class 36,000 lbs., and the committee will consider proposed changes in minimum on a large number of specific commodities.

A rule will be proposed requiring petitions for changes in the classification to be filed 45 days in advance of action instead of 30 days, as is required at present, except when, by unanimous consent, the rule shall be waived.

Another subject docketed for consideration is a proposed requirement of stronger and better packages. The subject of getting increased revenue from perishable freight will also be discussed. It is proposed to amend existing rules so as to provide that in order to secure the carload rate the quantity of freight required under the rules must be delivered at one forwarding station in one working day by one consignee for one consignor and destination, except that where freight is loaded in cars by the consignor it will be subject to the car service rules and charges of the forwarding railroad.

Freight Car Balance and Performance in 1907.

Arthur Hale, Chairman of the Committee on Car Efficiency, has issued Statistical Bulletin No. 26-A, a statement of freight car balance and performance, which is a consolidation of the figures in Statistical Bulletins Nos. 4 to 22, inclusive, with the addition of such reports as were received after the publi-

FREIGHT CAR EFFICIENCY IN 1907.

	GROUPS	ROADS REPORTING		No. Revenue Freight Cars Owned	PERCENT R. R. CARS ON LINE			Excess on Line Over Number Owned	Percent Cars in Shop	Av. Cars on Line Per Frt. Engine Owned	Average Miles per Car per Day	Percent of Loaded Mileage	AVERAGE TON MILES			AVERAGE DAILY EARNINGS		
		No.	Mileage Operated		Home	Foreign	Total						Per Car	Per Loaded Car	Per Car Per Day	Per Car Owned	Per R. R. Car on Line	All Cars on Line
JANUARY—JUNE 1907.	1. New England	7	6,688	56,675	63	89	152	32,766	2.39	137	17.0	73.4	10.6	13.6	183	$3.12	$2.12	$2.00
	2. N. Y., N. J., Del., Md., Eastern Pa	26	28,912	602,185	54	36	90	.....	5.40	69	24.5	68.0	15.4	23.5	376	2.44	2.65	2.41
	3. Ohio Ind., Mich., Western Pa	27	20,787	328,677	49	36	85	.....	5.41	73	23.5	68.4	15.9	23.5	374	2.00	2.31	2.15
	4. Va., W. Va., N. C. S. C	12	17,480	127,072	60	51	111	13,376	6.31	68	17.7	70.3	12.8	18.2	227	2.15	1.94	1.88
	5. Ky., Tenn., Ga., Ala., Miss	19	17,108	149,533	53	40	93	.....	3.93	71	25.4	71.3	15.5	17.2	336	2.29	2.49	2.39
	6. Ia., Ill., Wis., Minn., Dakotas	21	53,305	353,423	62	33	95	.....	4.10	57	25.5	67.5	12.9	17.5	325	2.57	2.76	2.65
	7. Mont., Wyo., Neb., Dakotas	3	3,282	15,736	32	79	111	1,737	5.95	43	45.5	70.1	12.0	13.9	546	5.84	5.26	5.19
	8. Mo., Ark., Kans., Colo., Etc	15	22,245	125,284	50	37	87	.....	6.64	50	25.5	71.9	12.3	17.0	312	2.75	3.15	2.98
	9. Texas, Louisiana, New Mexico	12	7,089	19,970	62	112	174	14,815	4.48	76	24.1	67.4	10.3	15.2	254	4.91	2.78	2.62
	10. Ore., Idaho, Nev., Cal., Arizona	18	22,139	105,016	57	63	120	21,187	5.36	65	28.3	70.7	12.2	17.2	345	4.55	3 80	3.52
	11. Canadian Lines	4	9,642	59,615	57	41	98	.....	5 25	50	27.4	77.9	12.3	15.8	337	2.42	2.45	2.31
	12 Mexican Lines	5	4,851	13,662	94	20	114	1,854	5.91	66	26.3	70.4	10.6	15.2	276	3.85	3.39	3.38
	GRAND TOTAL	169	214,115	1,956,848	56	41	97	.....	5.18	66	24.3	69.2	14.0	19.8	338	2.57	2.68	2.50
JULY—DECEMBER 1907.	1. New England	5	4,454	37,696	59	63	122	8,225	3.46	69	17.7	74.0	10.3	13.9	182	2.52	2.08	2.01
	2. N. Y., N. J., Del., Md., Eastern Pa	23	33,583	638,019	60	36	96	.....	4.92	69	24.0	67.7	15.5	22.8	375	2.35	2.44	2.28
	3. Ohio, Ind., Mich., Western Pa	22	16,531	281,631	54	36	90	.....	6.83	75	22.2	67.9	16.3	23.8	304	1.98	2.20	2.08
	4. Va., W. Va, N. C. S. C	13	17,797	132,442	57	39	96	.....	7.88	59	19.3	69.5	13.0	18.7	251	1.98	2.06	2.02
	5. Ky., Tenn., Ga., Ala., Miss	19	17,941	162,977	54	36	90	.....	4.87	63	23.8	71.8	13.1	17.6	310	2.23	2.48	2.37
	6. Ia., Ill., Wis., Minn, Dakotas	22	54,607	369,893	71	29	100	.....	4.79	61	25.1	73.2	14.2	19.3	353	2.57	2.63	2.49
	7. Mont., Wyo, Neb., Dakotas	2	3.349	16.266	33	100	133	5,393	4.62	54	37.1	71.8	14.4	21.0	544	6.44	4.84	4.47
	8. Mo., Ark., Kans., Colo., Etc	15	21,934	132,940	58	38	96	.....	9.06	57	21.6	70.2	12.3	18.0	267	2.55	2.63	2.51
	9. Texas, Louisiana, New Mexico	13	7,627	24,524	46	98	144	10,736	5.55	63	23.6	68.2	11.3	16.5	264	4.03	2.81	2.64
	10. Ore., Idaho, Nev., Cal, Arizona	17	21,848	105,919	61	63	124	25,663	5.91	63	26.5	69.6	13.6	19.6	361	4.49	3.68	3.45
	11. Canadian Lines	6	16,935	94.476	67	29	96	.....	6.39	51	27.5	76.0	12.5	16.4	341	2.47	2.57	2.47
	12. Mexican Lines	2	453	461	80	237	317	981	.98	52	12.4	65.0	13.3	20.5	165	9.33	2.94	2.80
	GRAND TOTAL	158	216,972	1,998,921	60	38	98	.....	5.73	64	23.7	70.0	14.4	20.7	324	2.41	2.54	2.40
YEAR 1907.	1. New England	6	5,569	47,187	63	80	143	29,494	2.78	102	17.2	73.7	10.5	13.8	183	2.85	2.16	2.00
	2. N. Y., N. J., Del. Md., Eastern Pa	24	31,248	620,102	58	36	94	.....	5.13	69	24.2	67.8	15.4	23.1	375	2.39	2.54	2.34
	3. Ohio, Ind., Mich., Western Pa	25	18,659	305,154	53	36	89	.....	6.14	74	22.9	68.2	16.1	23.6	370	1.99	2.25	2.12
	4. Va., W. Va, N. C., S. C	12	17,639	129.757	58	45	103	4,506	7.59	63	18.5	69.9	12.9	18.5	239	2.06	2.00	1.95
	5. Ky., Tenn., Ga., Ala., Miss	19	17,524	156,255	53	38	91	.....	4.58	67	24.5	71.6	14.3	17.8	323	2.26	2.48	2.37
	6. Ia., Ill., Wis., Minn., Dakotas	21	53.956	361,658	66	31	97	.....	4.57	59	25.3	70.5	13.5	19.2	337	2.57	2.70	2.57
	7. Mont., Wyo., Neb., Dakotas	3	3,315	16,001	32	90	122	3,565	5.20	52	40.7	71.7	13.2	20.7	545	6.15	5.03	4.78
	8. Mo., Ark., Kans., Colo., Etc	15	22,089	129,112	54	38	92	.....	7.93	54	23.4	71.0	12.3	17.5	289	2.65	2.87	2.73
	9. Texas, Louisiana, New Mexico	12	7,358	22,247	53	104	157	12,776	4.81	69	23.9	67.8	10.8	15.9	259	4.42	2.79	2.63
	10. Ore., Idaho, Nev., Cal., Arizona	18	21,993	105,467	59	63	122	23,425	5.64	64	27.4	70.2	12.9	18.4	353	4.52	3.74	3.48
	11 Canadian Lines	5	13,289	77,045	63	34	97	.....	5.84	51	27.5	76.7	12.4	16.2	339	2.45	2.52	2.40
	12. Mexican Lines	4	2,652	7,041	94	27	121	1.447	4.61	65	25.7	70.1	10.7	15.4	265	4.04	3.36	3.34
	GRAND TOTAL	164	215.291	1,977 026	58	40	98	.....	5.47	65	24.0	69 6	14.2	20.3	331	2.53	2.61	2.45

cation of figures for any particular period. Mr. Hale states that figures for any particular road or roads will be furnished on request. The figures for the first half of 1907, for the second half, and for the entire year, by groups, are shown in the accompanying table.

Car Surpluses and Shortages.

Arthur Hale, Chairman of the Committee on Car Efficiency, has issued Statistical Bulletin No. 25-A giving a summary of freight car surpluses and shortages from October 30, 1907, to June 24, 1908. The bulletin shows a decrease in the total car surplus since June 10 of 36,696 cars, or from 349,994 to 313,298.

The total reduction in surplus cars since May 13, when the surplus reached its maximum of 413,605 cars, is shown to be 100,307 cars.

With reference to the reduction of the surplus since June 10, Mr. Hale says: "Of this decrease, 12,630 is in box cars and 13,595 in coal and gondolas. Reports indicate some further increase in the number of bad order cars, which will account for possibly 20 per cent. to 25 per cent. of the decrease in surplus available cars, the balance being a net improvement." The summary for 163 roads is shown in the accompanying table.

SURPLUSES AND SHORTAGES, BI-WEEKLY, FROM OCTOBER 30, 1907, TO JUNE 24, 1908, INCLUSIVE.

Date.	Number of roads.	Surpluses. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
June 24, 1908	163	123,112	18,042	130,149	41,995	313,298	266	34	120	31	451
June 10, 1908	164	135,742	19,078	143,744	51,430	349,994	180	11	23	213	427
May 27, 1908	160	144,697	20,075	162,695	54,437	381,904	82	13	12	18	125
May 13, 1908	163	143,822	22,949	183,041	54,722	404,534	100	33	16	10	159
April 29, 1908	159	147,971	24,350	186,742	54,542	413,605	145	42	16	64	267
March 18, 1908	160	103,509	25,122	119,205	49,206	297,042	533	151	250	73	1,007
February 19, 1908	161	113,776	30,088	134,217	44,432	322,513	697	141	249	162	1,249
January 22, 1908	161	124,622	27,328	142,338	48,292	342,580	392	132	79	135	738
December 24, 1907	158	87,714	14,740	64,556	42,300	209,310	187	81	191	265	724
November 27, 1907	160	16,246	3,645	10,028	10,429	40,348	11,908	868	2,964	2,224	17,964
October 30, 1907	161	786	600	1,285	1,275	3,946	61,592	3,546	15,987	9,632	90,757

The Crop Condition.

The Crop Reporting Board of the Bureau of Statistics of the United States Department of Agriculture finds, from the reports of the correspondents and agents of the bureau that the average condition of the cotton crop on June 25 was 81.2 per cent. of a normal, as compared with 79.7 on May 25, 1908; 72.0 on June 25, 1907; 83.3 on June 25, 1906, and 81.8 the average of the June conditions for the past 10 years.

The condition of cotton on June 25, 1908, with comparisons, by states, follows:

States.	June 25, 1908.	May 25, 1908.	June 25, 1907.	June 25, 1906.	June 25, 10-yr. Av.
Virginia	92	88	65	88	84
North Carolina	89	87	72	80	83
South Carolina	84	81	70	77	82
Georgia	83	80	78	82	81
Florida	84	82	83	77	85
Alabama	82	78	68	84	81
Mississippi	84	80	67	88	81
Louisiana	80	80	66	87	82
Texas	80	77	72	82	82
Arkansas	85	85	67	86	82
Tennessee	89	84	69	84	85
Missouri	87	86	64	91	84
Oklahoma	64	80	74	86	84
United States	81.2	79.7	72.0	83.3	81.8

For the purpose of comparison, the condition of the cotton crop in the United States monthly for the past 10 years is given below:

Years.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.
1907	70.5	72.0	75.0	72.7	67.7
1906	84.6	83.3	82.9	77.3	71.6
1905	77.2	77.0	74.9	72.1	71.2
1904	83.0	88.0	91.6	84.1	75.8
1903	74.1	77.1	79.7	81.2	65.1
1902	95.1	84.7	81.9	64.0	58.3
1901	81.5	81.1	77.2	71.4	61.4
1900	82.5	75.8	76.0	68.2	67.0
1899	85.7	87.8	84.0	68.5	62.4
1898	89.0	91.2	91.2	79.8	75.4
Average ten years	82.3	81.8	81.4	73.9	67.6

Co-operation Between Railroads and Shippers at St. Louis.

P. W. Coyle, Commissioner of the Freight Bureau of the Business Men's League of St. Louis, has issued a circular describing the plan that has been adopted for securing co-operation between the business interests and the railroads of St. Louis. Three joint standing committees representing the railroads and the shippers have been established to work in connection with the Bureau. For the purpose of considering any subject pertaining to the handling of shipments to local freight houses the following committee has been appointed:

Representing the railroads: John Fitzpatrick, Local Freight Agent Vandalia; E. J. McDonald, Local Freight Agent Wabash; D. C. Reel, Local Freight Agent St. Louis, Iron Mountain & Southern. Representing the shippers: J. M. Glynn, Traffic Manager L. M. Rumsey Manufacturing Co.; G. M. Cassidy, Traffic Manager Ferguson-McKinney Dry Goods Co.; W. C. Lindsay, Traffic Manager National Candy Co.

For the purpose of expediting the handling of tracers, the following committee has been appointed:

Railroads: William Gray, General Freight Agent Burlington; B. J. Rowe, Assistant General Freight Agent Illinois Central; Ed. Hart, Jr., Assistant General Freight Agent Baltimore & Ohio Southwestern; W. W. Miller, Assistant General Freight Agent Missouri, Kansas & Texas; L. W. Childress, President Columbia Transfer Co.; J. L. Penney, Traffic Manager Terminal Railroad Association. Shippers: O. Van Brunt, Traffic Manager Simmons Hardware Co.; J. E. Henry, Traffic Manager Medart Patent Pulley Co.; S. E. Jones, Traffic Manager John Deere Plow Co.; J. R. Johnson, Traffic Manager Butler Brothers; M. E. Markham, Traffic Manager Carleton Dry Goods Co.; George Danner, Traffic Manager Meyer Brothers Drug Co.; C. M. Cottam, Sales Manager Barrett Manufacturing Co.

For the purpose of improving the methods of prosecuting and expediting the handling of claims, the following committee has been appointed:

Railroads: J. S. Tustin, Freight Claim Agent Missouri Pacific; C. H. Newton, Freight Claim Agent Wabash; J. M. Denyven, General Freight Agent Mobile & Ohio; W. W. Miller, Assistant General Freight Agent Missouri, Kansas & Texas; G. F. MacGregor, Freight Claim Agent St. Louis & San Francisco; S. D. Webster, Freight Claim Agent Terminal Railroad Association. Shippers: S. E. Jones, Traffic Manager John Deere Plow Co.; C. M. Cottam, Sales Manager Barret Manufacturing Co.; J. R. Nemetz, Traffic Manager Crunden-Martin Woodenware Co.; W. C. Lindsay, Traffic Manager National Candy Co.; G. M. Cassidy, Traffic Manager Ferguson-McKinney Dry oGods Co.; E. H. Ehrler, Traffic Manager Graham Paper Co.; J. E. Henry, Traffic Manager Medart Patent Pulley Co.; A. M. Field, Traffic Manager Wrought Iron Range Co.; O. Van Brunt, Traffic Manager Simmons Hardware Co.

The following classification committee has been appointed:

G. M. Cassidy, Traffic Manager Ferguson-McKinney Dry Goods Co.; J. R. Johnson, Traffic Manager Butler Brothers; O. Van Brunt, Traffic Manager Simmons Hardware Co.; E. H. Ehrler, Traffic Manager Graham Paper Co.; L. A. Geserich, Assistant Secretary Moon Bros. Carriage Co.; George Danner, Traffic Manager Meyer Bros. Drug Co.; B. T. Clifford, Superintendent Scudders-Gale Grocer Co.; W. S. Dietz, Traffic Manager Bridge & Beach Mfg. Co.; E. T. Sheeran, Traffic Manager Norvell-Shapleigh Hardware Co.; W. C. Lindsay Traffic Manager National Candy Co.; A. M. Field, Traffic Manager Wrought Iron Range Co.; W. S. Mellen, Traffic Manager Mound City Paint & Color Co.; H. T. Price, Traffic Manager Wertheimer-Swarts Shoe Co.; C. M. Cottam, Sales Manager Barrett Manufacturing Co.; H. H. Ruwe, Traffic Manager St. Louis Sash & Door Works.

The following committee on water transportation has been appointed:

George Danner, Traffic Manager Meyer Bros. Drug Co.; W. S. Crilly, Traffic Manager Hargadine-McKittrick Dry Goods Co.; C. H. Fenn,

Superintendent Crane Co.; C. Frankel, Traffic Manager Brecht Butchers' Supply Co.; A. S. Schember, Traffic Manager Hafner Mfg. Co.; C. F. Miller, Secretary Scarritt-Comstock Furniture Co.; C. F. Wassal, Traffic Manager Bemis Bros. Bag Co.

The following committee on electric railroad transportation and express service has been appointed:

J. R. Johnson, Traffic Manager Butler Bros.; George T. McClure, Traffic Manager Rice-Stix Dry Goods Co.; W. S. Mellen, Traffic Manager Mound City Paint & Color Co.

Supply of Freight Cars Above Normal.

W. F. Allen, secretary of the American Railway Association, has prepared a statement which shows that on February 1, 1908, railroad companies, members of the association, had in service 300,000 more freight cars than were required for the business of the country under the average conditions of the fiscal year of 1907. The data shows that non-member roads in the United States on the same date had provided themselves with only two-thirds of the equipment which their business demanded, and even within the association there were 79 roads deficient, which deficiency was made up by the excess equipment of the other 127 members.

As the average earnings per freight car do not vary greatly from one road to another, it is easy to estimate the service of cars by the receipts for freight. Mr. Allen shows that the number of revenue freight cars in service as reported by the interstate commission was, on the dates indicated, as follows:

June 30, 1905	1,675,895
June 30, 1906	1,778,051
Average number in service during the year ended June 30, 1906	1,726,973

The total freight earnings reported by the same authority for the year 1906 were $1,646,031,877, indicating average earnings of $953 per car per year, or about $2.61 per day. Allowing for an excess error of 4.1 per cent in the cars reported will make the calculation an even $1,000 a year, which, for convenience, is taken as a sufficiently accurate measure of the freight equipment required for the service of a road based upon its total freight earnings.

And he finds the substantial accuracy of this measure verified by the figures for the fiscal year 1907. The number of freight cars in revenue service in the United States on July 1, 1906, reported by the commission, was 1,778,051. On July 1, 1907, the American Railway Association reported 1,947,363 cars in use in the same territory, indicating an average number in use during the year of 1,862,707 cars. But the delivery of new cars was much greater during the latter part of that year than during the first half, so that the average number in service was probably several thousand less than this figure. The total freight earnings of the year were $1,826,209,000. Here again the approximate average of $1,000 per freight car per year is confirmed.

In February, 1908, American Railway Association members owned or controlled 2,094,771 cars in the United States. The non-members controlled 28,860 cars. The proportion of equipment that should have been provided on the $1,000 basis to the amount actually provided for the two classes of roads is therefore as follows:

	What the companies should provide $1,000 basis.	What the companies did provide.	Surplus.
American Ry. Association..	1,783,550	2,094,771	311,221
Non-members	42,629	28,860	*13,779

*Shortage.

In order to transact the business actually performed this shortage of 13,779 cars must have been supplied by members of the association.

Among the members of the American Railway Association there are 127 roads which have an equipment in excess of the requirement calculated on this basis of $1,000 earnings per car. The 127 roads actually owned 1,771,178 cars, while their requirements were only 1,339,311 cars, showing that they owned a surplus of 431,867 cars.

On the other hand there were 79 roads which had less equipment than is required on this basis. These roads actually own 323,593 cars, while their requirements call for 444,239 cars, showing a deficiency of 120,646 cars.

The roads which have a surplus, therefore, provide for the deficiency of 120,646 cars belonging to roads members of the association, and for 13,779 cars belonging to non-members, or a total of 134,425 cars.

If, as these figures indicate, there are about 300,000 more freight cars on the lines of the railroads in the United States to-day than are necessary to carry lading sufficient to earn $1,000 each per annum, the average established by the high record traffic of 1906 and 1907, it is obvious that the excess over the number required to handle the present volume of traffic with cars fully loaded is very much greater. The last report of the association on surplus cars fixed the number as of June 10, at 350,000 cars, but this figure does not include the largely increased number of cars in shop.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Erie has ordered from the Baldwin Locomotive Works the 15 Pacific type locomotives mentioned in the *Railroad Age Gazette* of July 3.

The Canadian Pacific has ordered from the Locomotive & Machine Co., of Montreal, 20 locomotives, for delivery by the middle of September.

	General Dimensions.	
Type of locomotive	Consolidation.	10-wheel.
Weight on drivers	168,000 lbs.	142,000 lbs.
Total weight of engine	192,000 "	190,000 "
Driving wheel base	15 ft. 10 in.	14 ft. 10 in.
Total wheel base, engine	24 " 4½"	26 " 1 "
Total wheel base, engine and tender	53 " 3¼"	54 " 6½"
Cylinders	22½ x 28 in.	22½ x 28 in.
Piston valves, diameter	11 in.	11 in.
Drivers, diameter	58 in.	63 in.
Driving journals	Main 9½ in.; others 12 in.	Main 9½ in.; others 12 in.
Working steam pressure	180 lbs.	180 lbs.
Boiler, type of	Ext. wagon top, radial stay.	Ext. wagon top, radial stay.
Firebox, length	96⅝ in.	102⅛ in.
Firebox, width	65¼ in.	69⅞ in.
Tubes, number and diameter	240 2-in.. 24 5-in.	240 2-in., 24 5-in.
Tubes, length	14 ft. 2½ in.	14 ft. 4 in.
Tank capacity	5,000 Imp. gals.	5,000 Imp. gals.
Coal capacity	10 tons.	10 tons.
Special Equipment.		
Brakes	Westinghouse.	Westinghouse.
Brake-beams	Simplex.	Simplex.
Couplers	Tower.	Tower.
Valve gear	Walschaert.	Walschaert.
Superheater	Vaughan-Horsey.	Vaughan-Horsey.

CAR BUILDING.

The Yonkers Railroad has ordered 15 electric cars from the St. Louis Car Co.

The National Car Line has ordered five tank cars from the Bettendorf Axle Co.

The Canadian Northern has ordered three sleeping cars from Barney & Smith.

The Chicago & Alton is getting prices on 1,000 all-steel gondola cars of 100,000 lbs. capacity.

The Dayton Street Railway, Dayton, Ohio, has ordered 20 cars from the Barney & Smith Car Co.

The Central Kentucky Traction Co., Frankfort, Ky., has ordered two cars from the J. G. Brill Co.

The East St. Louis & Suburban, East St. Louis, Ill., has ordered 20 electric cars from the American Car Co.

The Estacado & Gulf intends to ask bids on rolling stock on August 1. W. A. Butts, President, Ft. Worth, Tex.

The Seattle Electric Co., Seattle, Wash., has ordered 16 trailer cars and four motor cars from the St. Louis Car Co.

The Lexington & Interurban Railways Co., Lexington, Ky., has ordered two large interurban cars from the J. G. Brill Co.

The Starks Heater Car Co., Chicago, recently reported in these columns as asking prices on 200 cars, has ordered 100 potato cars from the Haskell & Barker Car Co.

The Texas Southeastern has ordered ten box cars of 60,000

lbs. capacity from the American Car & Foundry Co. and five flat cars of 60,000 lbs. capacity from the Georgia Car Co.

The Intercolonial has ordered ten second class sleeping cars, as follows: Four from Rhodes, Curry & Co., three from the Crossen Car Manufacturing Co., and three from the Silliker Car Co., Halifax, N. S.

The Gary & Interurban, Gary, Ind., has ordered two semi-convertible electric cars from the Danville Car Co., to be equipped with two G. E.-80 motors. The cars will be 30 ft. long over bodies and 42 ft. long over all. They are for September delivery.

The Temiskaming & Northern Ontario has ordered 50 steel underframe box cars of 80,000 lbs. capacity from the Dominion Car & Foundry Co. These cars will be 36 ft. long and 8 ft. 6 in. wide, inside measurements; 7 ft. 10¾ in. high from top of sills to under side of plate, and 13 ft. high, over all. The special equipment includes:

Bolsters	Simplex
Brakes	Westinghouse
Brake-beams	Simplex
Brake-shoes	Steel back
Couplers	Tower steel, with Acme device
Journal bearings	Canadian Bronze Co.
Side bearings	Susemihl

IRON AND STEEL.

The Sun Ning Railroad, China, is in the market for 3,800 tons of rails.

The Chicago & North-Western is in the market for 2,000 tons of steel for miscellaneous bridge construction.

The Ohio Valley Railroad is said to have ordered about 800 tons of bridge steel from the Pennsylvania Steel Company.

The Baltimore & Ohio, it is said, has ordered 35,000 tons of rails from the Carnegie Steel Co. and the Maryland Steel Co.

The Western Electric Co., Chicago, is asking bids on about 500 tons of structural steel for a building in connection with the proposed additions to its plant. The total tonnage required will be about 15,000 tons.

Just before sailing on the Kronprinzessin Cecilie for a six weeks' trip abroad, Judge Gary, Chairman of the Board of the United States Steel Corporation, issued a statement in reference to the steel trade, in which he said: "From the viewpoint of the United States Steel Corporation the iron and steel business has been better during the last two weeks than at any time since the depression of last October. Undoubtedly the result of the Chicago convention has contributed largely to this favorable condition. The tendency since the beginning of the calendar year has been toward improvement, with some fluctuations, until the readjustments in prices were made in the early part of June, when the placing of orders, in most lines, was practically suspended. This was because many of those who were contemplating additional purchases were in doubt as to whether or not there would be further adjustments. However, there seems to be a general feeling that bottom prices have been reached, and this, coupled with the satisfactory outcome of the Chicago convention, has increased buying and also increased specifications against old orders. It is hoped present conditions will at least be maintained during the summer, although it is not expected business will be brisk or entirely satisfactory during the next 60 days, nor until there is a general feeling that the nominees of the Republican convention are absolutely certain of election. When that time arrives, it seems to some of us, at least, the iron and steel industry of this country will be prosperous."

RAILROAD STRUCTURES.

Baltimore, Md.—A contract has been awarded to John F. Potts & Sons, Baltimore, for grading about 11 acres of land belonging to the Maryland & Pennsylvania, on which, it is said, extensive terminal facilities, including yards and warehouses, will be built.

Brownsville, Tex.—It is said that the bridge to be built by the St. Louis, Brownsville & Mexico across the Rio Grande will cost about $400,000. Antonio Anza, engineer of the Mexican government department of public works, is to supervise the construction. (June 26, p. 406.)

Denison, Tex.—The proposed union station to be used by all railroads entering Denison, which will contain the North and South divisional offices of the Missouri, Kansas & Texas, will be two and three stories high, of brown brick and terra cotta. The building will, it is said, cost $175,000.

Duluth, Minn.—The city council has ordered $30,000 worth of bridge improvements within the city. About seven bridges are to be repaired and strengthened so as to carry street railway traffic. One of the important improvements will be on the bridge at Grand avenue and Thirty-ninth street, to cost $4,500, while a more expensive job will be the repair work on the bridge at Seventy-third street and Grand avenue, to cost $7,600. The remainder of the appropriation is divided up among some five other bridges. City Engineer McGilvary is in charge of the work.

Guanajuata, Mex.—The Mexican Central passenger station, mention of which was made in the *Railroad Age Gazette*, June 26, is to be one story high, 28 ft. x 100 ft., and built of brick. It is being built by the railroad company, and will cost about $12,500.

Houston, Tex.—An officer writes that it will probably be 60 or 90 days before definite plans are arranged for the building of the union passenger station by the Houston Belt & Terminal Railway. W. E. Green, President, Houston, Tex.

Philadelphia, Pa.—The Philadelphia & Reading has awarded the contract to Edward Fay & Sons for the erection of a car cleaning plant at Broad street and Lehigh avenue.

Sherman, Tex.—The Texas & Pacific and the Houston & Texas Central have submitted plans to the Texas Railroad Commission for a depot to be used jointly by the two roads.

Terre Haute, Ind.—The Cleveland, Cincinnati, Chicago & St. Louis has begun work on remodeling the passenger station. It is expected that the new roundhouse and repair shops, which were to have been built at the Duane yards in April, will be erected soon. The plans for the roundhouse call for a 14-stall building of stone construction and the repair shops will have a capacity of from 15 to 20 cars a day.

Visitacion, Cal.—It is said that a complete repair and construction plant is to be built by the Harriman interests. The plant will consist of car shops, repair shops, boiler, paint and locomotive shops, together with large coal bunkers, oil storage plants, freight sheds and a large roundhouse.

SUPPLY TRADE NOTES.

The main offices of the Wyckoff Pipe & Creosoting Co. have been moved from Stamford, Conn., to 50 Church street, New York.

A. Bement, Consulting Mining and Mechanical Engineer, Chicago, has removed his offices from the American Trust building to 2114 Fisher building.

The Russell Car & Snow Plow Co., Ridgway, Pa., has just shipped to the Temiskaming & Northern Ontario at North Bay, Ont., another size 2, wing elevator snow plow with flangers.

D. W. Ross, Managing Director of the Magnus Metal Co., New York, and the Hewitt Manufacturing Co., Chicago, has resigned to become Vice-President of the Interborough Rapid Transit, New York.

The Carnegie Steel Co., Pittsburgh, Pa., has bought the property of the Schoen Steel Wheel Co., Philadelphia, Pa., whose plant is at McKees Rocks, Pa. The price paid, it is said, was $3,000,000.

The Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has arranged to be represented on the Pacific coast by Otis & Squires, 111 New Montgomery street, San Francisco, Cal. A large stock of standard Cutler-Hammer controllers will be carried. A. W. Vinson, who has for several years been connected with the Engineering Department of the Cutler-Hammer company, will have headquarters at this office.

The Western Electric Co., Chicago, will soon begin the

erection of three new buildings at its Hawthorne works, Forty-eighth avenue and West Twenty-second street, to provide room for manufacturing carried on at present at its Clinton street and Polk street plants. These improvements will cost from $500,000 to $600,000. Bids are now being received for one five-story building, of fireproof construction, to cost about $400,000.

The General Fireproofing Co., Youngstown, Ohio, is adding a building 60 ft. x 200 ft. to its plant. This building will be used for the manufacture of steel office furniture and filing devices, including steel sections or units, desks and tables. This furniture is finished to resemble oak or mahogany. Among the advantages claimed for it over wood are: it is fire resisting, space saving, indestructible through use, and is unaffected by moisture.

The Merchandise Creditors' Committee of the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., reports that 95 per cent. of all the merchandise creditors have assented to the merchandise creditors' plan. Substantial progress has been made toward securing from stockholders, employees and others the $6,000,000 of cash subscriptions to assenting stock required by the plan. Of the employees of the company, about 5,000 have made subscriptions aggregating about $600,000. The Readjustment Committee has agreed to a further extension, to September 1, within which to finally complete the matter. The Receivers have paid the interest due July 1. The Readjustment Committee asks the bank creditors to sign agreements to accept for their claims: Either (*a*) 50 per cent. in convertible bonds at par; 20 per cent. in assenting stock at par, and 30 per cent. in four, five and six-year notes; or (*b*) 50 per cent. in convertible bonds at par, and 50 per cent. in 15-year notes.

TRADE PUBLICATIONS.

Paints.—The July issue of *Graphite*, of the Joseph Dixon Crucible Co., Jersey City, N. J., devotes several pages to illustrations and articles about the Atlantic City conventions.

Steel Lockers and Shelving.—Merritt & Co., Philadelphia, Pa., have recently issued a pamphlet describing their universal steel shelving and metal equipment, also a pamphlet describing "Unit" steel lockers.

Cross Ties and Lumber.—G. S. Baxter & Co., New York, have issued specifications for their Georgia and Florida long leaf yellow pine cross ties and lumber and bald cypress cross ties, made in three standard sizes; 7 in. x 9 in. x 8 ft. 6 in., 6 in. x 9 in. x 8 ft. and 6 in. x 8 in. x 8 ft.

Light Locomotives.—The Vulcan Iron Works, Wilkesbarre, Pa., have just issued several circulars containing full information regarding some of the various types of locomotives which they build, including light freight and passenger, switching, logging, plantation and contractor's locomotives.

Foundry Equipment.—The Whiting Foundry Equipment Co., Harvey (Chicago suburb), Ill., has issued its Foundrymen's Reference Book which illustrates and describes complete foundry equipment, such as the Whiting cupola and accessories, electric travelers, air hoists, tumblers, Moyer tramrail system, turntables for industrial tracks, etc.

Iron and Steel.—A catalogue of 144 pages, giving in detail the stock list for July and August, has been issued by the Scully Steel & Iron Co., Chicago. The publication is well illustrated and an index makes its contents easily accessible. An accompanying folder announces the absorption of the business and property of Kelley, Maus & Co., Chicago.

The Missouri Pacific-Iron Mountain Lines in Missouri.—"Recreation Near Home" is the title of an interesting pamphlet just issued by the passenger department. It gives considerable information of value to pleasure seekers and sportsmen. Quite a little space is given to views and maps of the country described and two pages are devoted to the game and fish laws of Missouri.

Universal Portland Cement.—Monthly Bulletin No. 50 of the Universal Portland Cement Co., Chicago and Pittsburgh, Pa., gives a description, with illustrations, of the mixing and laying of concrete used in the reconstruction of the tracks of the Chicago City Railway; also views showing the application of reinforced concrete in bridge and track elevation construction.

Machine Tools.—A booklet just issued shows in a compact and convenient form the entire line of machine tools made by the Gisholt Machine Co., Madison, Wis. The publication is vest pocket size, 72 pages, and illustrates and describes turret lathes, vertical boring mills, universal tool grinders, horizontal drilling machines, double emery grinders, worm hobbing machines, gear testing machines, chucks, etc.

Designing Methods for Reinforced Concrete.—The plan of the Expanded Metal & Corrugated Bar Co., St. Louis, Mo., to issue monthly bulletins on designing methods for reinforced concrete was noted in this column June 5. The June bulletin, which is No. 2, gives the detailed design for a typical reinforced concrete building, based on the methods outlined in the May bulletin. The analysis of the strength of rectangular and T-shaped beams has been included in the June bulletin because of the large demand for this discussion of the subject. It is similar to that appearing in the 1906 catalogue, though considerably revised and extended. The July bulletin will treat of highway bridges, and culverts of the flat, slab and girder types.

Cableways.—The Lidgerwood Manufacturing Co., New York, has just issued a new catalogue describing and illustrating Lidgerwood cableways, showing their many applications on great engineering works and for numerous other purposes where large quantities of materials have to be hoisted, conveyed and delivered quickly and economically. The 168 pages are filled with illustrations and data which forms a complete study of cableway practice. The photographs show engineering works where Lidgerwood cableways have been or are now being used. These include many of the important projects of recent years in many parts of the world. The modifications of the cableways in details and setting to fit them for economical performance of various kinds of work required are shown by excellent half-tones, and the descriptive text makes clear the important conditions met in the prosecution of each of these enterprises.

Self-Starting Devices for Alternating-Current Motors.—Devices for the automatic control of induction motors are described in Bulletin No. 4,590, just issued by the General Electric Co., Schenectady, N. Y. The automatic compensators described are designed for remote or automatic operation of the General Electric form K induction motors, or other motors of the squirrel cage type in sizes of 5 h.p. and larger. They consist of two main oil-immersed switches worked by solenoids, which are excited from one phase of the current supply. With the closing of the exciting circuit of the solenoids, one of the main switches automatically connects the motor to the line through the compensator coils, and an adjustable time relay opens the first main switch at the proper time, cutting the compensator coils out of circuit and closing the second main switch, thus throwing the motor directly on the line. The switches are arranged to be easily inspected and the entire device is mounted on a slate panel having pipe supports which hold it at a convenient height. The same publication describes an automatic control equipment for use in connection with the General Electric Form M three-phase induction motors, the principal use of which is in maintaining a predetermined air pressure, water pressure or water level, by automatically starting and stopping motor-driven pumps in the supply mains.

Ellis Automatic Track Inspector Tested on the Alton.

The Ellis automatic track inspector, which was described in *The Railway Age*, July 12, 1907, has recently been tested on the Chicago & Alton with satisfactory results. It will be recalled that this device is designed to trace on a continuous strip of paper a record to show variations in gage, the amount of elevation and the condition of spirals on curves, and the grades on tangents. It weighs about 200 lbs. and is attached behind a hand car, velocipede or inspection car, being driven at any speed up to 12 m.p.h. In the Alton test, it was run over a four-mile section of double-track, first on one main track and then on the other. The results were checked with a track level and track gage and found to be correct. The

device saves much time, showing in a few minutes what would take probably a day to find out in the ordinary way. It is made by the Railroad Automatic Track Inspector Co., Tacoma, Wash.

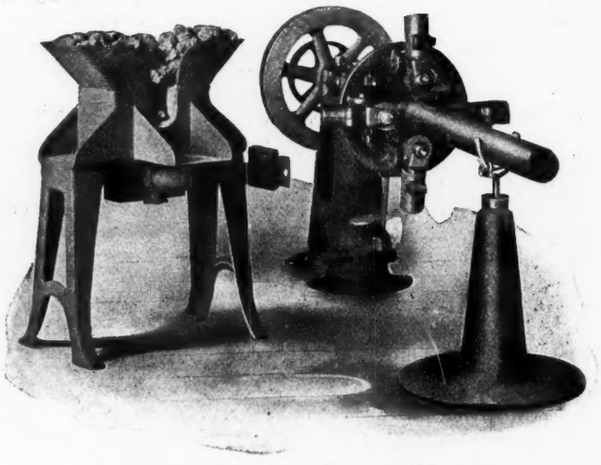
Ryerson Flue Welding Machine.

The Ryerson flue welding machine consists of a heavy substantial base on which a revolving shaft is mounted. This shaft carries the driving pulley and fly wheel at one end, while at the other end, and continuous with it, is an internal roller carrying mandrel. This mandrel resembles the ordinary roller type flue expander and is designed to roll the inside of the tube during the welding process. These mandrels are made in all sizes and are interchangeable by simply screwing the threaded end into the end of the driving shaft. A steel head and arms carrying large adjustable rollers revolve with the shaft, the rollers being placed equidistant and in the same vertical plane as the mandrel rollers. By pressing the foot treadle, shown in the illustration, the outside rollers are brought down toward the mandrel rollers until they are only separated from them by the thickness of the tube wall. This assures the weld being true to gage and smooth. The arrangement of the four rollers is such that they can be adjusted by anyone, and as this is the only adjustment necessary, the machine is easy to operate.

The following advantages claimed for this machine will appeal to every one interested in flue welding. The Ryerson machine is driven entirely from the pulley (or gear if motor-driven) and no air or steam is necessary to exert the pressure on the welding point. This does away with all connections, leaks, etc., as well as the expense of the operation of pneumatic machines. It also makes the machine portable to a considerable extent. The machine is said to be the only one which rolls the lap of the weld on the inside. Rollers are set in the mandrel and so arranged that all rollers are carried at the same time and speed. Rolling the tube from the inside and outside while welding ensures a smooth weld, true to gage and practically invisible.

Another advantage is in the simple and accurate adjustment of the rollers. In setting, the cold tube is placed on the mandrel and the arms of the machine are adjusted to the thickness of the cold tube, which requires no skill and can be done in less than five minutes. The adjustment of these rolls is such that they can be set to roll within a hundredth of an inch. The mechanism is positive and, when once set, every tube welded will be of exactly the same size. The rolls cannot be brought closer together by the foot lever than the point at which they are adjustable and locked. This machine has no gears. All fast running parts are so arranged that the slightest wear can be taken up. Many of the principal railroad and contract shops are now using this machine.

In addition to welding, it will scarf, spread or cut off tubes as desired. This is done by substituting the proper scarfing rolls, spreading device or cutting wheels for the roll mandrel.



Ryerson Flue Welding Machine.

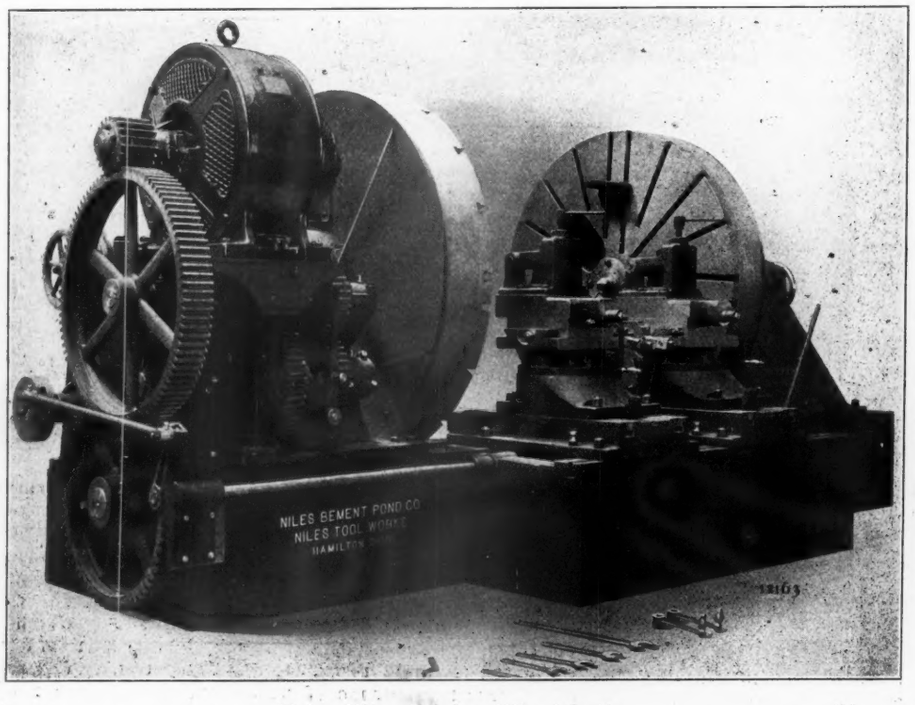
While welding with this machine, the operator is free to handle the tubes. A small pair of light special tongs, furnished with the machine, are used in one hand to prevent the tube from turning while being welded. A suitable stand is also furnished, provided with an adjustable fork and spool roller. The shipping weight of the machine complete is 1,200 lbs. It is made by Joseph T. Ryerson & Sons, Chicago.

New Tool Post.

In turning locomotive driving wheel tires under modern conditions, it has been found best to have a separate tool for each operation. This necessitates changing tools very frequently. With the new Niles driving wheel lathes even the heavy roughing cut takes but 10 or 15 minutes and the finishing of the tire with flange tools, etc., is a matter of only a minute or two. The old type of tool post, where four bolts have to be screwed down, held the tool firmly enough, but it was cumbersome and placed a great deal of work on the operator.

The new tool clamp of the machine shown in the accompanying illustration has only one screw so that three-fourths of the labor of clamping tools is avoided, and they may be changed much quicker than with the old device. The clamp is substantially made, steel castings being used, and has proven very satisfactory in service. The extra heavy driving wheel lathes of the Niles make are now being equipped with 50 h.p. motors. They are also equipped with a new form of sure-grip driver in which the saw teeth are forced into the tire by a screw.

The illustration shows a 90-in. extra heavy driving wheel lathe made by Niles-Bement-Pond Co., New York.



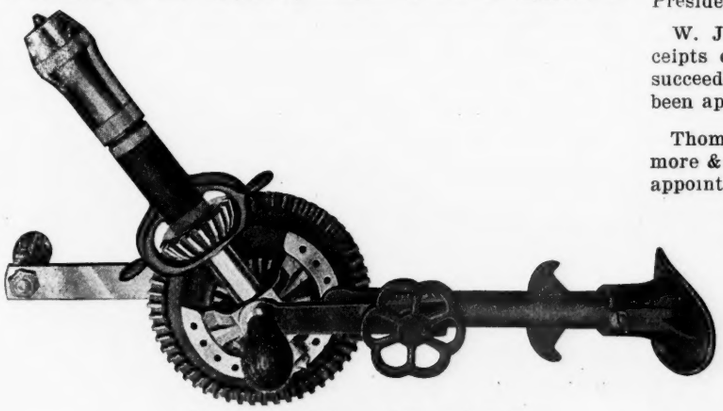
90-in. Niles Driving Wheel Lathe.

Uses of Shelby Steel Tubing.

At a banquet given some time ago to the officials of the National Tube Co., Pittsburgh, Pa., the dinner set was made of Shelby seamless steel tubing. This material may be hammered flat, as in knife blades and spoon handles; curved in or out, as in the plates or spoon bowls; left in its original form, as in the napkin rings, and expanded at one end to several times its original diameter, as in the goblets. The makers say that over 300 uses have already been found for Shelby tubing, and new uses are constantly being added.

Universal Breast Drill.

The universal breast drill made by the Lancaster Machine & Knife Works, Lancaster, N. Y., is shown in the accompanying illustration. The drill has a chain feed attachment, which is operated by the supporting handle. It can be adjusted to



Lancaster Universal Breast Drill.

any angle, making it easy to work between girders and joists, or in the interior of machines, where space is limited. For all such work it has a screw feed. When limited space prevents a full turn of the handle the ratchet can be used.

The drill has two speeds, which can readily be changed, and the sweep of the handle is also adjustable. The gears are machine cut. The head and socket are ballbearing and handles are of cocobolo wood. The chuck is fitted with forged steel alligator jaws which will firmly hold both round and square shank drills. The drill can, however, be fitted with a three-jawed chuck.

Staybolt Tests.

The following table shows results of vibratory tests of eight samples of Falls hollow staybolt iron manufactured by the Falls Hollow Staybolt Co., Cuyahoga Falls, Ohio. The tests were made at the laboratory for testing materials at Purdue University last May:

	Tension load, per sq. in.	Revolutions, per minute.	No. of revolutions to rupture.
No. 1	4,000 lbs.	100	10,188
" 2	4,000 "	100	13,123
" 3	4,000 "	100	8,339
" 4	4,000 "	100	9,363
" 5	4,000 "	106	8,868
" 6	4,000 "	100	10,880
" 7	4,000 "	100	11,888
" 8	4,000 "	100	5,318
Average			9,746

The tests were made on an Olsen staybolt machine in accordance with the specifications recommended by the Committee on Staybolts of the American Society for Testing Materials.

These specifications include the following:

Tensile strength, not less than 48,000 lbs per sq. in.

Per cent. of elongation in 8 in., not less than 28.

Per cent. of contraction of area, not less than 45.

The bolt must stand 6,000 revolutions, when one end is fixed and the other end (3 in. from fixed end) is moved in a circle of $\frac{5}{32}$ in. radius, while the bolt is under a tension load of 4,000 lbs. per sq. in. The bolts were threaded with standard staybolt dies, 12 threads to the inch.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

E. Alexander, chief clerk to the President of the Canadian Pacific, has been appointed Assistant Treasurer, succeeding H. C. Suckling.

C. O. Kalman has been appointed General Auditor of the Chicago Great Western, in charge of the accounting and freight claim departments.

S. F. Parrott, Vice-President and General Manager of the Georgia Southern & Florida, has resigned, effective as soon as a successor is appointed. Mr. Parrott has been elected President of the Atlantic Compress Co.

W. J. Wright has been appointed Auditor of Freight Receipts of the Missouri Pacific, with office at St. Louis, Mo., succeeding W. Q. Morcom, resigned. W. H. Malcolm has been appointed Assistant Auditor of Freight Accounts.

Thomas Fitzgerald, formerly General Manager of the Baltimore & Ohio, Harry K. Wolcott and Hugh M. Kerr have been appointed Receivers of the Norfolk & Southern, Mr. Fitzgerald acting as General Manager for the receivers. The office of President, Vice-Presidents and Secretary have been abolished. All other officers and employees will continue in their present positions.

R. O. Barnard has been appointed Treasurer of the Chicago Great Western, reporting to the Receivers. R. C. Wight has been appointed Secretary of the Receivers, and will have charge of all the records and accounts which have heretofore been in his possession or control as Secretary of the railroad company. Mr. Wight will perform such other duties as the Receivers may from time to time require and will report directly to them.

D. W. Ross, Managing Director of the Magnus Metal Co., New York, and the Hewitt Manufacturing Co., Chicago, has resigned to become Vice-President of the Interborough Rapid Transit, New York. Mr. Ross was, a few years ago, private secretary to President J. T. Harahan, of the Illinois Central, from which position he was promoted to Purchasing Agent and General Superintendent of Transportation. Later he was appointed Purchasing Agent of the Isthmian Canal Commission, which position he held until his connection with the Hewitt company. Mr. Ross assumed his new duties on July 8.

Operating Officers.

The office of Superintendent of the Southern at Nashville, Tenn., has been abolished, the Southern no longer operating the Tennessee Central.

S. Buchanan, Agent of the Canadian Pacific at Windsor, Ont., has been appointed Superintendent of the Upper Lake steamships at Owen Sound, Ont.

The Illinois Central has abolished the office of Superintendent at Nashville, Tenn., the Tennessee Central now being independently operated.

T. A. Lawson, Superintendent of the Western division of the Southern Pacific, with office at Oakland Pier, Cal., resigned to go to the Chicago & North-Western.

J. W. Mulhern, formerly Superintendent of the Chicago, Burlington & Quincy at Galesburg, Ill., has been appointed Superintendent of the Eastern division of the Chicago & Alton, with headquarters at Bloomington, succeeding W. B. Causey, resigned. Effective July 1.

J. R. Nelson, Superintendent of District 3, Ontario division, of the Canadian Pacific, has been appointed Superintendent of District 2, with office at London, Ont., succeeding C. Murphy, promoted. W. K. Thompson, Superintendent of District 1, Ontario division, succeeds Mr. Nelson. J. K. McNeillie, Assistant Superintendent at Toronto, succeeds Mr. Thompson.

S. C. Stickney has been appointed General Manager of the Chicago Great Western, with control of the various operating and traffic departments, and will report to the Receivers. W. B. Causey, Superintendent of the Chicago & Alton at Bloomington, Ill., has been appointed Superintendent of the Eastern division of the Chicago Great Western, with headquarters at Chicago, succeeding C. P. Stembel, resigned.

Traffic Officers.

J. S. Hall has been appointed General Agent of the Michigan Central at Detroit, Mich.

C. W. Nash has been appointed Freight Claim Agent of the Delaware & Hudson at Albany, N. Y.

T. A. Rousseau has been appointed General Freight and Passenger Agent of the Tennessee Central.

L. S. Cass has been appointed General Traffic Manager of the Chicago Great Western, reporting to the General Manager.

W. B. Hinchman has been appointed General Agent of the Tonopah & Tidewater and the Bullfrog Goldfield at San Francisco, Cal.

W. B. Robbins has been appointed Traveling Freight Agent of the Lake Erie & Western at Indianapolis, Ind., succeeding W. A. Keller, transferred.

W. G. Howard, Traveling Freight Agent of the Chicago & Alton and the Toledo, St. Louis & Western at Cincinnati, Ohio, has been appointed Commercial Agent.

L. F. Moore, General Freight Agent of the Quincy, Omaha & Kansas City at Kansas City, Mo., has been appointed Commissioner of the Wichita Commercial Club.

W. B. Shirk has been appointed Commercial Freight Agent of the Missouri Pacific at Alexandria, La. J. W. Harley has been appointed Freight Agent at Alexandria.

H. M. Dressell has been appointed General Agent, Passenger department, of the Wabash, with headquarters at St. Louis, Mo., succeeding T. F. Harrington, resigned.

F. S. Brooks has been appointed Assistant General Freight Agent of the Atchison, Topeka & Santa Fe at Galveston, Tex., succeeding J. R. Dillon, who resigned January 1, 1908.

H. J. Falkenbach, Commercial Agent of the National Railroad of Mexico at Pittsburgh, Pa., has been appointed Commercial Agent of the National Lines of Mexico at Pittsburgh.

F. W. Elder, Traveling Passenger Agent of the Chicago & Alton and the Toledo, St. Louis & Western at Columbus, Ohio, has been transferred to Cincinnati, with headquarters in the Union Trust building.

George E. Herring, Traveling Passenger Agent of the Louisville & Nashville at Atlanta, Ga., has been transferred, as Traveling Passenger Agent, to Cleveland, Ohio. J. R. Almand succeeds Mr. Herring at Atlanta.

The Southern Railway has abolished the offices of General Freight Agent, District Passenger Agent and Soliciting Agent at Nashville, Tenn., the Tennessee Central now being independently operated. R. B. Pegram, General Freight Agent, has been transferred to other territory.

In surrendering its portion of the Tennessee Central the Illinois Central has abolished the offices of Assistant General Freight Agent and City Passenger Agent at Nashville, Tenn. W. E. Downing, Assistant General Freight Agent, is transferred to Memphis, Tenn., with the same title.

James P. Orr, General Freight Agent of the Northwest system of the Pennsylvania Lines West, has been appointed Traffic Manager, a new office, with headquarters at Pittsburgh, Pa. J. J. Koch, Division Freight Agent at Pittsburgh, succeeds Mr. Orr. J. D. Lippincott, Division Freight Agent of the Pittsburgh, Cincinnati, Chicago & St. Louis at Pittsburgh, succeeds Mr. Koch. James E. Weller succeeds Mr. Lippincott.

William C. Maxwell has been appointed General Traffic Manager of the Wabash, succeeding D. O. Ives, resigned. Mr. Maxwell entered railroad service in 1881 as a messenger in the local freight offices of the Chicago, Burlington & Quincy at Keokuk, Iowa. In 1884 he was employed in the general freight and ticket office of the St. Louis, Keokuk & North-Western, now part of the Burlington, and from 1889 to February, 1890, was chief clerk in the general freight office of the same road. He was then made General Agent of the Burlington at Keokuk, and in 1902 was made Assistant General Freight Agent at St. Louis, Mo. He was transferred to St. Joseph, Mo., in 1904, and in 1905 was made Assistant General Traffic Manager of the Wabash, from which position he is now promoted to General Traffic Manager.

Engineering and Rolling Stock Officers.

J. G. Gwyn, Assistant Chief Engineer of the Denver & Rio Grande, has been appointed Chief Engineer, with headquarters at Denver, Colo.

R. B. Smith has been appointed Foreman of Motive Power and Equipment of the Cincinnati, Lebanon & Northern, at Pendleton, Ohio, succeeding John Stutter, resigned.

The title of D. J. Durrell, General Foreman of the Pittsburgh, Cincinnati, Chicago & St. Louis and of the Cincinnati, Lebanon & Northern, at Cincinnati, Ohio, has been changed to Master Mechanic.

S. W. Hodgin, Assistant Division Engineer of the Pittsburgh division of the Pennsylvania Lines West, has been appointed Engineer of Maintenance of Way of the Cleveland & Marietta division.

A. J. Isaacs, Foreman of Locomotive Repairs of the Chicago & Alton at Kansas City, Mo., has been appointed Master Mechanic of the Chihuahua division of the Mexican Central, with headquarters at Chihuahua, Chih., succeeding S. E. Kildoyle, resigned.

F. N. Crowell, Engineer of Maintenance of Way of the Northwest system of the Pennsylvania Lines West at Cambridge, Ohio, has been appointed Engineer of Maintenance of Way of the Southwest system at Richmond, Ind., succeeding Guy Scott, transferred.

J. Q. Barlow, Chief Engineer of the George's Creek & Cumberland, has been appointed Assistant Chief Engineer of the Southern Pacific at San Francisco, Cal., succeeding J. H. Wallace, resigned. Among his other duties he will have charge of maintenance of way.

L. F. Lonnbladh has been appointed Chief Engineer of the Tennessee Central. J. J. Clark, Master Mechanic of the Nashville Terminal, has been appointed Master Mechanic of the Tennessee Central. F. M. Carter, Supervisor of Bridges and Buildings at Nashville, Tenn., of the Southern Railway, has been appointed Supervisor of Bridges and Buildings of the Tennessee Central.

William Byrd Page, who was recently appointed Assistant Superintendent of Machinery of the Mexican Central, with headquarters at Aguascalientes, Aguas., Mex., was born in 1866 in Philadelphia, Pa. He graduated from the University of Pennsylvania, class of 1887, with a degree of B. S., and received the degree of M. E. in 1888. He began railroad work in September of that year in the Altoona shops of the Pennsylvania. In 1893 he was made traveling foreman of the Middle division of the Pennsylvania and later in the same year assistant roundhouse foreman of the Pittsburgh division at Altoona. From August, 1893, to April 1, 1894, he was Assistant Road Foreman of Engines of the Pittsburgh division. He was then appointed Assistant Master Mechanic at the Meadows shops and the next year was made Assistant Engineer of Motive Power of the Philadelphia and Erie division of the Pennsylvania. In 1899 he was made Assistant Engineer of Motive Power of the Philadelphia, Baltimore & Washington, and the next year was appointed Master Mechanic of the Belvidere division of the Pennsylvania. In 1905 he was made Master Mechanic at Camden on the same road, which position he held until his recent appointment.

Purchasing Agents.

M. E. Towner, assistant to Vice-President E. L. Pollock of the Chicago, Rock Island & Pacific, has been appointed Purchasing Agent of the St. Louis & San Francisco, with headquarters at St. Louis, Mo., succeeding W. E. Hudson, resigned.

Railroad Construction.

New Incorporations, Surveys, Etc.

ABERDEEN & HURON (ELECTRIC).—Incorporated in South Dakota with $2,500,000 capital to build an electric line from Huron, S. D., north to Aberdeen, 80 miles. The incorporators include J. A. Cleaver, L. Lapier, O. A. Ricker, R. W. Clarke, J. P. Stahl, R. C. Gibbs, G. W. Longstaff and H. J. Rice, all of Huron.

ALBERTA RAILWAY & IRRIGATION CO.—A branch line, about three miles long, will shortly be under construction between the main line in Alberta and the new coal shaft which the company is sinking. The office of the company is in Winnipeg, Man.

ASTORIA, SEASIDE & TILLAMOOK.—Incorporated with $2,000,000 capital stock to build an electric line from Astoria, Ore., to Tillamook, via Warrenton, Hammond and Seaside. This company is also authorized to build and operate telegraph and telephone lines over its proposed route, and to build and maintain elevators, docks and warehouses, and to operate steamers on the Columbia and Willamette rivers, Tillamook bay and the Pacific ocean. F. L. Evans, E. Z. Ferguson, H. G. Van Dusen and W. E. Buffum are the incorporators.

BUCKHANNON & NORTHERN.—Said to be awaiting the action of the courts of Monongalia county, W. Va., in the matter of granting a franchise. Construction will begin as soon as this franchise is obtained. A branch will also be built to Clarksburg. S. D. Brady, Chief Engineer, Parkersburg, W. Va.

CANADIAN PACIFIC.—J. E. Noonan and J. Robinson, of Regina, Sask., are said to have taken a large sub-contract on the Moosejaw extension. They will begin work with 100 teams.

CAZENOVIA & SAUK CITY.—Incorporated to build from La Belle, Wis., to Sauk City, 40 miles, connecting with the Chicago, Milwaukee & St. Paul at Sauk City. The road is capitalized at $30,000 and the incorporators include Joseph Duren, Joseph Lamkuehler and John Hanzlik, all of Cazenovia.

CUMBERLAND RAILROAD.—Said to have filed a mortgage to secure $3,000,000 bonds to complete its line from Barboursville, Ky., to Jellico, Tenn., 36 miles, 12 miles of which are completed. B. C. Milner, General Manager and Chief Engineer, Warren, Ky.

EL PASO & KANSAS CITY SHORT LINE.—Will soon begin surveying, it is said, the proposed route from El Paso, Tex., southwest to Quanah, 600 miles.

EL PASO & SOUTHWESTERN.—Will, it is said, spend $100,000 on improvements on the eastern division during the coming summer. Powers & O'Connor, El Paso, Tex., are said to be the contractors. H. J. Simmons, General Manager, El Paso.

ESTACADO & GULF.—An officer writes that grading from Roby, southeast to McCauley, will be completed about July 15. Cox & Brooks, contractors. W. A. Butts, Ft. Worth, Tex., is President of the railroad. (June 19, p. 208.)

GRAND TRUNK PACIFIC.—The following additional sub-contracts have been let by Foley, Welch & Stewart on their 100-mile contract eastward from Prince Rupert, B. C.: Norman McLeod, Kenora, Ont., 5½ miles; Dan Horrigan, 2¾ miles; Fred Peterson, 2 miles; W. Shtok & Co., St. Mary's, Idaho, 2 miles. (July 3, p. 457.)

GULF COLORADO & SANTA FE.—Said to be figuring on building an extension of the Glen Flora spur, about 25 miles, to reach the new oil fields near Markham, Tex. C. F. W. Felt, Chief Engineer, Galveston, Tex.

HARRIMAN LINES.—Vice-President Mohler, of the Union Pacific, is quoted as saying that extension work which was stopped several months ago will be resumed early in July. Work will be started on the Athol Hill cut-off in Colorado and the extension of the branch line along the North Platte river, from North Platte, Neb., to Northport.

KANSAS CITY, OZARKS & SOUTHERN.—Incorporated with $300,000 capital stock to build from Mansfield, Mo., southeast to Ava, 15 miles. J. H. Murray, H. E. Bash, J. M. Adams and A. P. Miller, all of Ava, are among the incorporators.

MANSFIELD RAILWAY & TRANSPORTATION CO.—Said to have let contracts to J. S. Moore, Lufkin, Tex., for a portion of the line from Sabine river to Center, Tex., on the line between that point and Mansfield, La. E. A. Frost, President, Shreveport, La.; L. H. Bell, Sr., Chief Engineer, Mansfield.

MINNESOTA AIR LINE.—Incorporated with $500,000 capital stock to build from Thief River Falls, Minn., northeast to Roosevelt on the Rainy river, about 70 miles. W. F. Hunt, President, Roosevelt, Minn.; R. Halsey, Vice-President, Waterville, Me.; R. H. Rockwood, Secretary, Iowa City, Iowa.

MISSOURI & NORTH ARKANSAS.—Reported to have begun operating passenger trains from Leslie, Ark., to Settlement, 35 miles. Grading from Settlement to Heber is expected to be completed by the end of July, and trains are to be run between Searcy, Leslie and Eureka Springs in September (April 10, p. 525.)

NEZPERCE & IDAHO.—Incorporated with $200,000 capital stock to build from Nezperce, Idaho, northeast to a connection with the Grainville branch of the Northern Pacific, 40 miles. Z. A. Johnson, President and General Manager; Ivan Jorgens, Secretary. Construction work will begin early in July at a point near Dublin, Idaho.

OKLAHOMA, BEAVER & WESTERN.—Organized to build from Oklahoma City, Okla., northwest to Beaver, connecting with the Santa Fe at Gage, Okla., and with the Rock Island at Hooker. Dr. J. M. Kerns, of Sunset, is President and General Manager; C. H. Adams, of Gage, Secretary.

OREGON INTERURBAN.—An officer writes that contracts have been let to M. A. Wogan, Ft. Leavenworth, Kan., for building the line from Forest City, Mo., to Oregon, 4½ miles. This work includes three 60-ft. steel girder bridges. George Custer, Chief Engineer, Oregon, Mo. (June 12, p. 92.)

PORT ARTHUR & HOUSTON SHORT LINE.—Contracts said to have been let to D. H. Donovan, of the Pennsylvania Construction Co., St. Louis, Mo., for building the entire line. Sub-contract for grading was let to C. L. Dwyer, of Houston, Tex. The route will be from Port Arthur, Tex., to Houston, via Hampshire, Wallisville, Cedar Bayou and La Porte, about 86 miles.

SOUTHERN RAILROAD OF TEXAS.—H. J. Bradshaw, General Manager, is said to have reported the line completed and ready for operation from Henrietta, Tex., southwest to Halsell, 11½ miles, and from Halsell to Scotland, about 8 miles.

SPOKANE, PORTLAND & SEATTLE.—The double-track bridge over the Columbia river at Vancouver, Wash., which was completed on June 25, cost, approximately, $2,000,000. The steel construction of the bridge was begun on June 15, 1907; about 15,000 tons of bridge steel was used. According to press reports, the bridge will be opened for service on August 15. This structure was described in detail in the *Railway Age* of March 20, 1908, page 385.

UNION CENTRAL.—Work is said to have been started at Palestine, Tex., by the W. A. Tenny Construction Co., Silver City, N. Mex. W. J. Hogue, Dallas, Tex., is President of the railroad.

UNION PACIFIC.—See Harriman Lines.

WATAUGA RAILROAD.—Organized to build from Edgemont, N. C., into Watauga county. L. T. Nichols, General Manager of the Caldwell & Northern, Chester, S. C., is interested.

WINNIPEG, YANKTON & GULF.—Intends, it is said, to build from Winnipeg, Man., to the Gulf of Mexico at either Matagorda bay, Tex., or Port Arthur. The route is from Superior, Neb., via Mankato, Beloit, Lincoln, Wilson, Great Bend, Kan., St. John, Greensburg and Coldwater, Buffalo, Okla., Woodward, Mutual, Selling, Taloga, Canton and Watonga to Oklahoma City, about 500 miles; also from Buffalo, Okla., west via Beaver, Guymon and Kenton, Okla., to Des Moines, N. Mex., about 300 miles. H. L. Miller, President, Russell, Kan.; W. L. Smith, First Vice-President; Charles Lundblade, Second Vice-President; O. W. Dawson, Secretary; J. George Brinkman, Treasurer; G. W. Moses, General Manager. (June 12, p. 96.)

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ATLANTA, BIRMINGHAM & ATLANTIC.—This company has secured trackage rights over 19 miles of the Louisville & Nashville tracks between Pelham, Ala., and Birmingham.

BALTIMORE & OHIO.—The Guaranty Trust Co., New York, is offering $2,072,000 prior lien 3½ per cent. bonds at 92¼. This is the remainder of a total authorized issue of $75,000,000. The bonds are secured by a first mortgage subject to a nominal lien of about $71 per mile of track on the main line from Baltimore, Md., to Wheeling, W. Va., and Pittsburgh, Pa., and by a first lien on equipment valued at $50,000,000.

CHICAGO SOUTHERN.—The July 1 coupons of the 5 per cent. mortgage bonds were not paid. The directors made the following statement to holders of the bonds: "In view of negotiations now pending for the exchange of $710,000 outstanding collateral notes, being the balance of an issue of $4,000,000 due July 1, 1907, it is deemed best not to pay the interest on the company's mortgage bonds, lest such payment antagonize the holders of the collateral notes. It is expected that arrangements will be made in a few days to buy the coupons of the 5 per cent. bonds."

CINCINNATI, HAMILTON & DAYTON.—Members of the noteholders' committee announced on July 1 that as the receiver had failed to provide funds to pay the semi-annual interest then due on the 4 per cent. refunding bonds, the committee would buy these coupons.

The interest due July 1, 1908, on the $4,672,000 first refunding mortgage 4 per cent. 50-year bonds of the Cincinnati, Indianapolis & Western, and on the $3,162,000 first mortgage 5 per cent. 40-year bonds of the Indianapolis, Decatur & Western was not paid. A committee has been formed to look after the bondholders' interests. It consists of Frederick H. Ecker, T. W. Lamont, William A. Read, A. H. Wiggin, of New York; George Johnson, Philadelphia; C. E. Cotting, Boston. F. N. B. Close, 7 Wall street, New York, is secretary. The Cincinnati, Hamilton & Dayton owns the entire capital stock of the C., I. & W. and the I., D. & W., and has guaranteed the principal and interest of the above bonds, except $2,229,000 of the Indianapolis, Decatur & Western 5 per cent. bonds.

CINCINNATI, INDIANAPOLIS & WESTERN.—See Cincinnati, Hamilton & Dayton.

GALVESTON TERMINAL RAILWAY.—The Texas Railroad Commission has authorized the issue of $25,000 stock and $1,108,000 of the $5,000,000 first mortgage bonds authorized by the stockholders in April, 1908.

HAVANA CENTRAL.—The shareholders on June 23 authorized an issue of $3,500,000 bonds secured by a mortgage covering terminal and other property; also an issue of £600,000 ($3,000,000) 3-year sterling notes secured by the new bonds and other collateral.

INDIANAPOLIS, DECATUR & WESTERN.—See Cincinnati, Hamilton & Dayton.

KANSAS CITY RAILWAY & LIGHT.—The National City Bank and N. W. Harris & Co., both of New York, are offering $1,200,000 Metropolitan Street Railway of Kansas City, Mo., consolidated mortgage 5 per cent. bonds of 1895-1910 at a price to yield 6 per cent. These bonds were issued to refund the $1,200,000 Grand avenue bonds maturing July 10, 1908. Of the authorized issue of Metropolitan Street Railway bonds, there are now $5,534,000 outstanding.

KEOKUK & DES MOINES.—The directors have declared a dividend of 1¼ per cent. on the preferred stock payable August 1. This is the first dividend the road has paid for three years. The road is leased to the Chicago, Rock Island & Pacific for 25 per cent. of its gross earnings. It runs from Keokuk, Iowa, to Des Moines, 162 miles.

MUNICIPAL TRACTION (CLEVELAND).—This company, which is operating all the street car lines in Cleveland, Ohio, under Mayor Johnson's 3-cent fare plan, has reported a deficit for May. The company must pay a 6 per cent. dividend on the stock of the Cleveland Railway Co. or forfeit its right to operate the lines. The 3-cent fare with a 1-cent charge for each transfer has been in force for a little more than two months.

NEW ORLEANS RAILWAY & LIGHT CO.—George H. Burr & Co., New York, are offering at par the unsold portion of an issue of $1,300,000 one-year 6 per cent. collateral notes dated June 20, 1908. These notes are secured by $2,400,000 of the company's general mortgage 30-year 4½ per cent. bonds.

NEW YORK CITY RAILWAY.—B. J. Arnold, who has been employed by the Public Service Commission to investigate the condition of the subway, with the object of increasing its carrying capacity, has been retained to appraise the properties of the street railways in New York City. This appraisal has been ordered because of the contention of the receivers that the old system of almost universal transfers cannot be continued without loss.

The Metropolitan Street Railway, New York, has made a new agreement with the Central Crosstown Railroad Company and is to continue to operate the Central Crosstown and to pay interest on the funded debt and other fixed charges. The old agreement called for, among other things, 15 per cent. annual dividend on the stock of the Crosstown company. This has now been cut off.

NEW YORK, NEW HAVEN & HARTFORD.—A decree has been entered by the Superior Court of Connecticut compelling the New York, New Haven & Hartford to endorse and guarantee all payments on dividends on the preferred shares of the New England Investment & Security Co., which is the holding company for the New Haven company's trolley properties in Massachusetts.

NORFOLK & SOUTHERN.—This road has been put in the hands of receivers. Thomas Fitzgerald, formerly General Manager of the Baltimore & Ohio, Harry K. Wolcott and Hugh M. Kerr are the receivers.

ST. PAUL & DES MOINES.—See Des Moines, Iowa Falls & Northern.

SEATTLE ELECTRIC.—This company, which is under the management of Stone & Webster, Boston, Mass., has declared a first dividend of 2¾ per cent. on its $5,000,000 common stock.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS.—Coutts & Co., London, England, are offering the unsold portion of $1,000,000 general mortgage 4 per cent. bonds at 97. There are $20,800,000 of these bonds outstanding.

VERA CRUZ TERMINAL.—This is a union terminal company, incorporated to take over the railroad and water terminal facilities at Vera Cruz, V. C., Mex. There were authorized £1,000,000 ($5,000,000) 4¾ per cent. coupon debenture bonds, of which £728,000 ($3,640,000) were purchased by J. S. Morgan & Co., London, and the Dresdner Bank at 93. They were offered to the public at 96½.

WESTERN MARYLAND.—The interest due July 1 on the bonds of the following companies was paid on presentation: the West Virginia Central & Pittsburg, the Potomac Valley Railway, the Baltimore & Cumberland Valley Railroad Extension Co., the Baltimore & Cumberland Valley Railroad and the Baltimore & Cumberland Valley Railway.

WESTERN PACIFIC.—The syndicate headed by Blair & Co., William Salomon & Co. and William A. Read & Co., all of New York, which underwrote in 1905 the Western Pacific's 50-year first mortgage 5 per cent. bonds, has been extended for another year.

WHEELING & LAKE ERIE.—The interest due July 1 on the $2,094,000 equipment trust 5 per cent. bonds of 1902-1922, was not paid at maturity.

YORK (PA.) RAILWAYS.—Brown Bros. & Co., New York, are offering at par $3,400,000 first mortgage 30-year 5 per cent. bonds of 1907-1937. This is part of a total authorized issue of $10,000,000, of which $3,400,000 is outstanding. The York Railways operate 77 miles of street railways centering in York, Pa.